UNITED STATES OF AMERICA

BEFORE THE

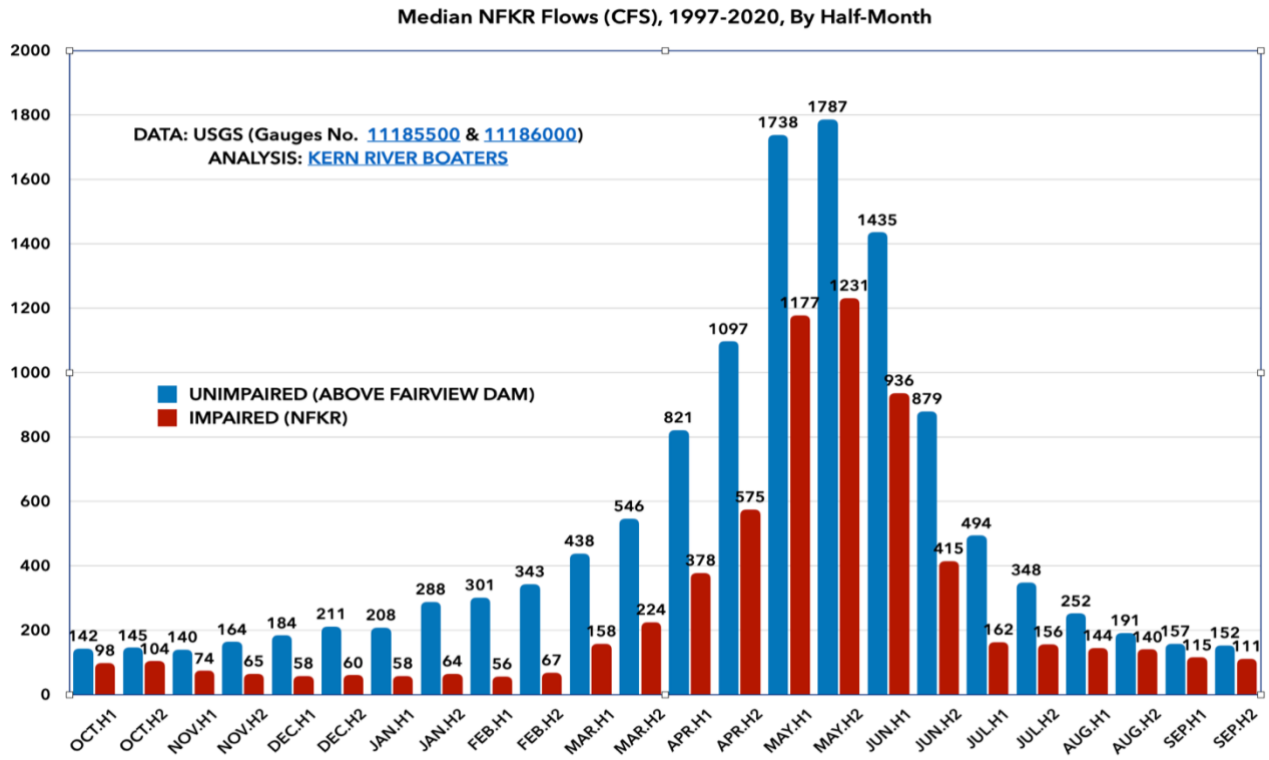
FEDERAL ENERGY REGULATORY COMMISSION

IN RE

SOUTHERN CALIFORNIA EDISON
KERN RIVER NO. 3 HYDROPROJECT

DOCKET NO. P-2290-122

KERN RIVER BOATERS' COMMENTS, STUDY REQUESTS, AND INFORMATION REQUESTS IN RESPONSE TO PRELIMINARY APPLICATION DOCUMENT AND SCOPING DOCUMENT ONE



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I • INTRODUCTION

Kern River Boaters ["KRB"] is a nonprofit, all-volunteer public interest group[1] of more than 900 persons[2] supporting the interests of noncommercial whitewater recreation in the Kern River watershed. For the past decade, KRB has been the primary advocate for whitewater recreation within the Kern River Valley, and has been instrumental in Commission proceedings designed to secure additional boating days[3], obtain[4] and protect[5] online gauges, oppose[6] non-license appropriation of water for hydro operations, uphold recreation reporting requirements[7] , and preserve unspoiled river canyon views.[8] KRB has also engaged in USACE proceedings to decommission the Borel hydroproject[9], USFS proceedings for increased river access[10], pathway safety[11], and boater parking[12], BLM

[1] http://kernriverboaters.com
[2] https://www.facebook.com/groups/kernriverboaters
[3] FERC eLibrary No. 20121214-5237
[4] https://www.dreamflows.com/graphs/day.682.php
[5] FERC eLibrary No. 20211008-5059
[6] FERC eLibrary No. 20210603-5168
[7] FERC eLibrary No. 20141112-5302
[8] FERC eLibrary No. 20210611-5039
[9] https://www.kernriverboaters.com/s/2016-01-04_KRB_COMMENT_ISABELLA_SEA3.pdf
[10] https://www.facebook.com/groups/kernriverboaters/permalink/1591464781132599/
[11] https://www.kernriverboaters.com/blog/2017/8/14/success-at-the-limestone-put-in?rq=limestone
[12] https://www.kernriverboaters.com/blog/2015/3/12/parking-to-be-re-established-at-the-limestone-takeout

proceedings for river access under COVID restrictions[13], and county proceedings to preserve a bridge gauge. KRB has also submitted numerous public records requests, attended annual USFS outfitters' meetings on the Kern, and engaged with its members and the public through social media[14] in support of its mission.

On September 22, 2021, Southern California Edison ("Edison") filed its notice of intent to seek a new license to operate the Kern River No. 3 hydroproject ["KR3"], accompanied by a preliminary application document ["PAD"]. On November 21, 2021, the Commission filed its first scoping document ["SD1"]. This filing is in response to both.

II • COMMENTS ON THE PAD

1.1. Background

Edison: *The 40.2-megawatt (MW) run-of-river Project . . . .* (PAD at p. 1-1.)

KRB: This description of the project is false. As established in the 1996 Environmental Assessment for this project, the project is incapable of generating electricity at a rate of 40.2 megawatts ["MW"] due to physical limitations — namely, the maximum amount of water the project can convey from Fairview Dam to the powerhouse: "the powerhouse hydraulic capacity of 670 cfs is not achieved because the water conduit maximum limit is 620 cfs."[15] Given this structural limitation, which Edison does not propose to change, the true operating capacity of this project is 36.8 MW.[16]

3.7. Major Water Uses

Edison: *35 cfs is diverted via the water conveyance system to provide cooler water to the CDFW Kern River Fish Hatchery . . . .* (PAD at p. 3-10; see also p. 4-16.)

KRB: This statement is false. As established in the 1996 EA, "The minimum flow of water required for [project generator] operation is 35 cfs."[17] The hatchery, by contrast, requires only 25 cfs to operate. As stated in the 1996 EA, when the project is offline, it "continues to divert 25 cfs into the flowline" for the hatchery.[18] From the same document: "25 cfs is always diverted at Fairview Dam [for the] hatchery."[19] In a 2004 deviation report, the

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[13] https://www.kernriverboaters.com/blog/2021/3/8/2021-usfs-outfitters-meeting?rq=blm
[14] https://www.facebook.com/groups/kernriverboaters
[15] See FERC-USFS KR3 Environmental Assessment (1996) ["1996 EA"] at p. 5; available: https://www.kernriverboaters.com/s/FERC-EA-1996.PDF
[16] *Ibid.*
[17] 1996 EA at p. 5
[18] 1996 EA at p. 6
[19] 1996 EA at p. 34

California Department of Fish and Wildlife ["CDFW"] reaffirmed it did not need flows of 35 cfs or more for the hatchery; flows of 27-28 cfs were "well above" the hatchery's needs.[20]

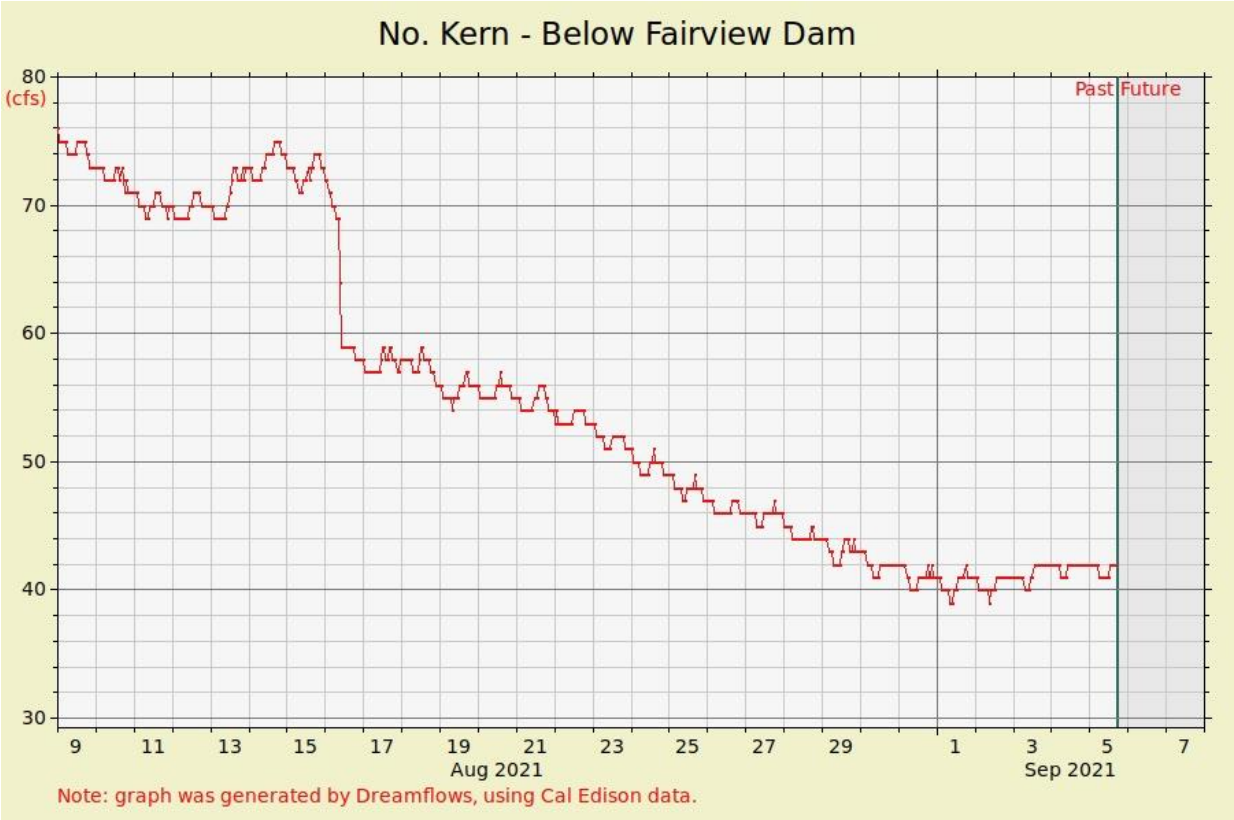
The purpose of the 35 cfs diversion is not to satisfy the requirements of the hatchery. Rather, as the 1996 EA established, the purpose is to "allow Edison to generate power" since "the minimum flow for generation at the powerhouse is 35 cfs" — not 25 cfs.[21] The 1996 EA found that the 35 cfs diversion was "to allow for minimum power generation," and that would more than satisfy "the CDF[W] fish hatchery (25 cfs) . . . ."[22]

It is inaccurate and misleading to refer to Edison's diversion of the first 35 cfs at Fairview Dam — which Edison has since increased to 40-45 cfs without a license amendment[23] — as a "hatchery flow" or to otherwise characterize the purpose of the diversion of that amount of water as being driven by hatchery operations. The hatchery does not require 35 (or 40 or 45) cfs to operate; the KR3 hydroelectric project does. Indeed, the hatchery has been closed for all of 2021.[24] Nevertheless, as the following graphs show, Edison continued diverting the first 42-43 cfs from the river, even as flows below Fairview Dam fell below 40 cfs during the hottest summer months when the natural fishery is most at risk:

[20] FERC eLibrary No. 20040916-0026 (unpaginated deviation report) at .pdf p. 3
[21] 1996 EA at p. 34
[22] 1996 EA at p. 58
[23] PAD at p. 4-16
[24] https://www.tehachapinews.com/news/hatchery-closes-down-again-following-three-years-of-renovations/article_05700dee-2e82-11eb-b380-674c961d7564.html

Figure 1: Flows Above Fairview Dam, Summer 2021

Figure 2: Flows Below Fairview Dam, Summer 2021



Again, the hatchery was closed during the period of time depicted by the graphs above.

The record demonstrates that the central purpose of the first-in-priority 35 (now 40-45) cfs diversion is to provide for minimum power generation — not hatchery operations — and it should be licensed and characterized that way.

4.4.2.2. Tunnels, Flumes, and Adits

Edison: *The floors and sides of the tunnel are lined with concrete, and the arched ceiling of the tunnel is lined only where rock appears to be unstable. Water flow in the tunnel does not achieve a depth of greater than 7.5 feet, making lining of the arched ceiling unnecessary.* (PAD at p. 4-7.)

KRB: In 2013-2014, Edison shut the project down for 16 months to complete, among other things, a "Tunnel Rehabilitation Project."[25] Edison improperly filed its entire application for that project as CEII because, as Edison later conceded, "only certain pages contained CEII."[26] Edison informed FERC it would "appropriately segregate the public and CEII" portions and "resubmit the Applications" for public inspection.[27] KRB does not see any such resubmission in the FERC eLibrary.

One aspect of the tunnel project was to "improve the structural integrity" of the tunnels.[28] Edison does not indicate whether it chose to use superior concrete mixes, modern epoxies and sealants, or suitable alternate material liners during this project. In the prior proceeding, Edison claimed it could provide no more than 300 cfs in recreation mitigation due to tunnel damage. But there is a history of tunnel damage pre-dating the recreational flow regime from the nature of water being transported across concrete: cracks and leaks are bound to develop in ordinary concrete, as can be seen on the *outside* of its concrete structures, let alone the interior of such. However, there are superior concrete mixes, modern epoxies and sealants, and alternative liner materials that have more robust properties and longer lifespans.[29] Given this history — and knowing the Congressional mandate to mitigate environmental and recreational losses from project operations — Edison should describe what steps it took during the tunnel rehabilitation project to improve the structural integrity of the tunnels so that recreational flows of more than 300 cfs could be afforded the public as mitigation for project operations or, if it did not take any, why not.

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[25] See FERC eLibrary No. 20130620-4015
[26] FERC eLibrary No. 20130806-5052 at p. 3
[27] *Id.,* at p. 3, fn. 6
[28] *Id.*, at p. 3
[29] See, *e.g.*, https://www.bestmaterials.com/PDF_Files/concrete-repair-guide-usbr.pdf ; https://nebula.wsimg.com/6d22154a2504a248dbd4457c6e6e20f9?AccessKeyId=8174FC00049DDC86865D&disposition=0&alloworigin=1

4.4.4.2. Gaging Stations

Edison: *SCE maintains two recording gaging stations that monitor and record water flow for Project compliance. The USGS annually reviews Project streamflow records from the USGS gages and publishes the reviewed records to their website. Provisional real-time hourly flows for Kern River near Kernville (SCE gage 401) and a calculated flow for Kern River above Fairview Dam (combined flows from SCE gage 401 and 402)* . . . . (PAD at p. 4-14.)

KRB: The USGS publishes data for Gauges No. 11185500[30] and 11186000[31], which monitor diverted flows in the project's conveyance and flows in the river below Fairview Dam, respectively. However, that published data only reflects values for the "daily average flow" at each location — *i.e.*, the arithmetic mean of a series of values captured throughout any given day.

A daily average flow is a place to start evaluating a project's effects, but it is a blunt instrument, and obscures many of the project's more granular effects, especially on days when the diurnal is significant. For instance, the diurnal during the spring runoff on the NFKR peaks during daylight hours, and many or most whitewater boaters report and recall their recreation based on those peaks, which are not reflected in a single daily average flow.

Edison provides hourly flow data to the public in real time, but that data is quickly lost, as there is no publicly available record of it. At the April 29, 2021 TWG meeting, SCE manager David Moore promised attending managing agents and stakeholders — who had been asking for the historical record of hourly flows at both gauges — that Edison was compiling hourly data and would provide it in the spring of 2022. We expect Mr. Moore to live up to his promise. The managing agencies should, too.

4.5.1. Water Management

Edison: *SCE includes an additional buffer of 5 to 10 cfs in the hatchery flow. SCE confirmed the appropriateness of this practice with a letter from FERC to SCE on September 29, 2004, and has continued this practice since that time. . . . If the natural flow is not available to meet both the hatchery needs and the MIF, the hatchery flows takes [sic] precedence over the instream flows below the dam* . . . . (PAD at p. 4-16.)

KRB: Edison's appropriation of an additional 5-10 cfs for minimum power generation without a license amendment or environmental review is presently a matter of contention before the Commission.[32]

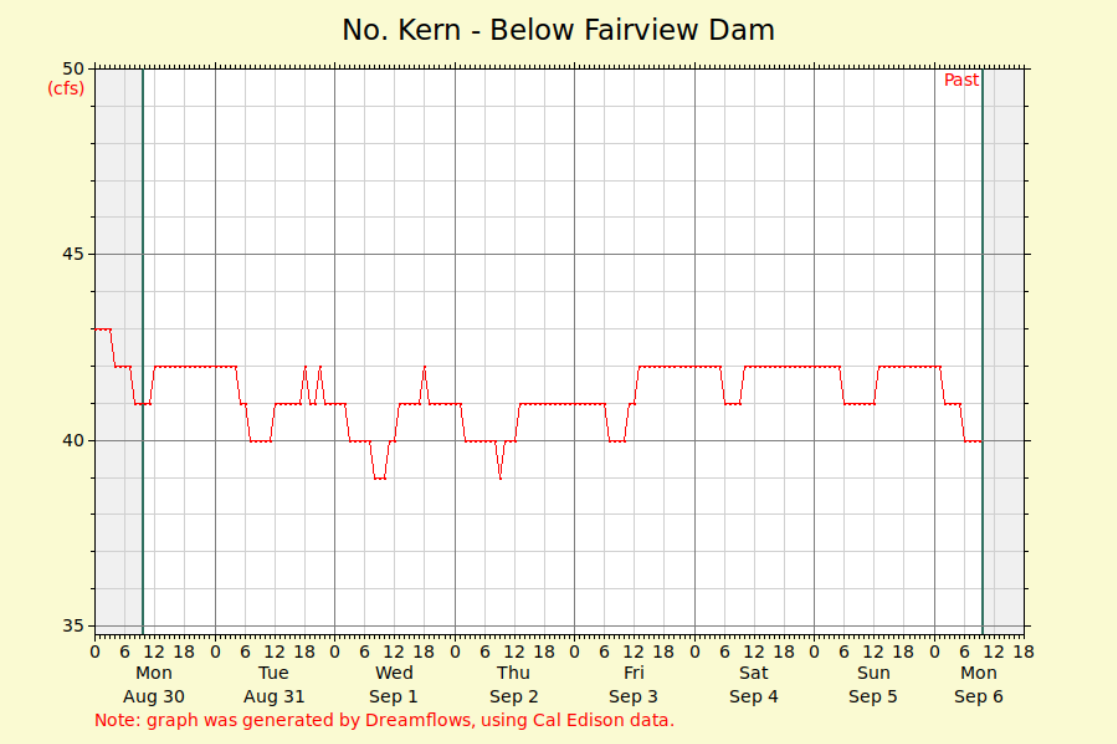
Many are surprised to learn that the minimum generation flow takes priority over the minimum instream flow ["MIF" or "fish flow"], which exists to protect the natural fishery below Fairview Dam. "Typically," FERC and USFS concluded in the 1996 EA, "we

[30] https://waterdata.usgs.gov/nwis/dv?referred_module=sw&site_no=11185500
[31] https://waterdata.usgs.gov/nwis/dv?referred_module=sw&site_no=11186000
[32] See FERC Docket No. P-2290-120

would recommend that the minimum flow or inflow, whichever is less, be released."[33] The precedence of the minimum generation flow means that in low water years, when incoming flows are not sufficient to satisfy both it and the MIF, it is the MIF that suffers the full extent of the deficiency, while power continues to be generated at the same minimal level.[34] In fact, because of the precedence of the minimum generation flow, if incoming flows at Fairview Dam ever fell below 40-45 cfs — they haven't yet, but they've gotten close — the project would leave this protected river bone dry.

Instream flows are critical to the health of a fishery. The "buffer" taken on top of the minimum generation flow comes at the natural fishery's expense when the fishery is most at risk: hot summer months of dry, low water years. In the summer of 2021, for instance, flows in the natural fishery dropped as low as 39 cfs. The buffer amounted to an *additional* 13-25% reduction of the fishery's flow, on top of the near 50% reduction entailed by the first-in-line minimum power diversion of 35 cfs.

Figure 3: A recent week (summer 2021) of extreme low flows in the fishery below Fairview Dam. Incoming flows above the dam were 80-84 cfs, but more than half was diverted for minimum power generation; note also, the hatchery was closed and had been closed since December 2020



[33] 1996 EA at p. 34

[34] See *supra*, Figure 1: Flows Above Fairview Dam, Summer 2021 & Figure 2: Flows Below Fairview Dam, Summer 2021

4.5.4. Project Facility Maintenance

Edison: *Table 4.5-3 SCE Operations and Maintenance Activities*

			as road base
Herbicide spraying	• Project facilities: sandbox, forebay, pressure tunnel, penstocks, and powerhouse	• Annually	• Pre-emergent herbicide spraying followed by post-emergent, as necessary [b] • If necessary, weed-whipping within flat areas prior to spraying
Structural Inspection	• Powerhouse	• Weekly and monthly	• If any issues, call specialist

(PAD at p. 4-21.)

KRB: We question the impact of spraying herbicide at the sandbox adjacent to this protected river corridor. Do these chemicals get in the river? Do these chemicals have the potential to affect the invertebrates that form the base of the fishery's food chain, as well as the amphibians and fish which feed upon them? The managing agencies should carefully examine these questions.

4.6. Other Project Information

Edison: *[null].* (PAD at p. 4-22.)

KRB: Edison provides no information regarding the greater social utility of its project, which can only be demonstrated by a description of the contemporary energy market and regulatory framework.

"During the afternoon of April 24, 2021, th[is] state's renewable generation hit a new all-time high, with 94% of California's electricity coming from solar, wind, and other clean energy sources."[35]

Though this is but a single data point, it speaks to two salient trends in this state's energy market: (1) ever-increasing amounts of electricity — including replacement energy for environmental and recreational curbs placed on project operations — are being provided by renewable sources; and (2) the energy provided by the project is decreasingly useful to this state at certain, predictable times — namely, (i) afternoons, (ii) weekends and holidays, and (iii) spring.

There is no stopping California's shift towards renewable energy sources. The inevitability is seen in the state's continuing phaseout of 18,000 megawatts of OTC plants[36] even as it in the process of losing the last of its 4,000 megawatts of nuclear[37] — those

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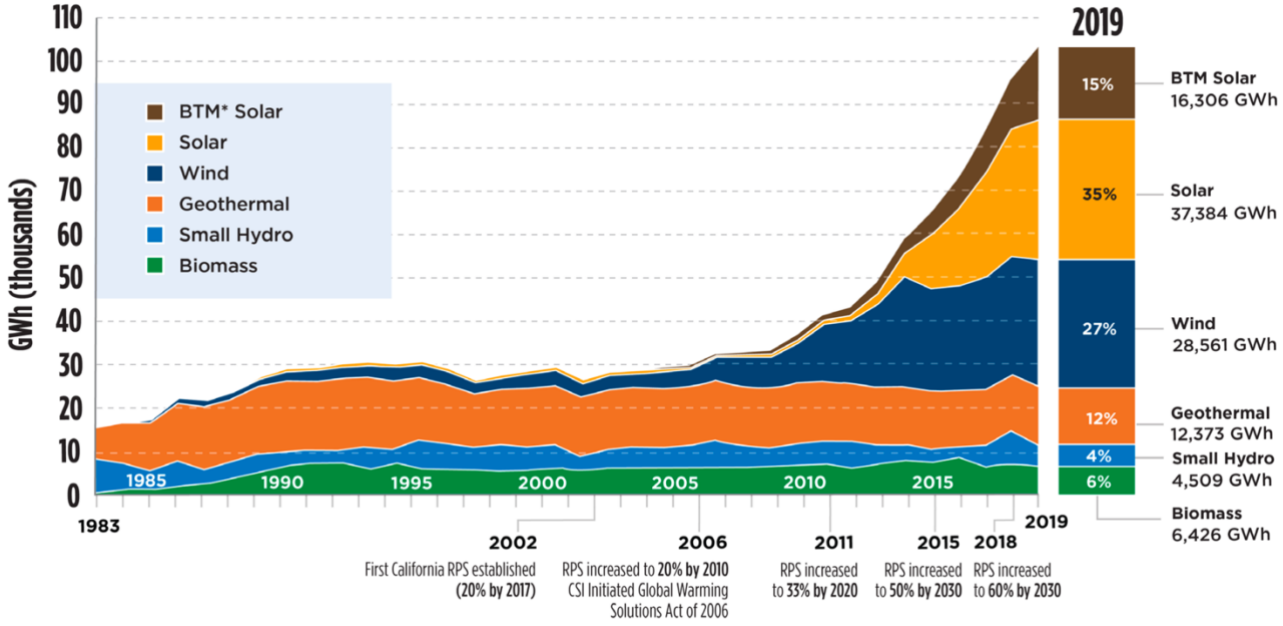
[35] https://www.gov.ca.gov/2021/07/30/governor-newsom-signs-emergency-proclamation-to-expedite-clean-energy-projects-and-relieve-demand-on-the-electrical-grid-during-extreme-weather-events-this-summer-as-climate-crisis-threatens-western-s/

[36] https://www.energy.ca.gov/sites/default/files/2019-12/once_through_cooling_ada.pdf

[37] https://www.pge.com/en_US/safety/how-the-system-works/diablo-canyon-power-plant/diablo-canyon-power-plant/diablo-decommissioning.page

amounts combining to account for almost half the state's electricity consumption on a summer day. The losses are being made up by more modern and rational wind, solar, and storage assets. People who live here have seen an incredible deployment of solar panels over the last decade: on all new construction, retrofitted to old construction, bunched into distributed energy resources, and aggregating at utility scale. California hit its interim target of 33% of electricity from renewable sources in 2020 — that's two years ahead of schedule.[38]

Figure 4: Total Renewable Generation Serving California Load by Resource Type, 1983-2019[39]



Over the last ten years, California has, on average, added 1 GW of utility solar and 300 MW of wind every year.[40] In the next three years, another 8 GW of renewable energy is set to come online.[41] The march of renewables is inexorable, and its rate of growth will only increase: Over the next 25 years, "California will need to sustain its expansion of clean electricity generation capacity at a record-breaking rate [and] build 6 GW of new solar, wind and battery storage resources annually."[42] KR3 has averaged generation at a clip of

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[38] https://www.gov.ca.gov/2021/07/30/governor-newsom-signs-emergency-proclamation-to-expedite-clean-energy-projects-and-relieve-demand-on-the-electrical-grid-during-extreme-weather-events-this-summer-as-climate-crisis-threatens-western-s/

[39] California Energy Commission, Tracking Progress (2019) at p. 5; https://www.energy.ca.gov/sites/default/files/2019-12/renewable_ada.pdf

[40] https://www.energy.ca.gov/news/2021-03/california-releases-report-charting-path-100-percent-clean-electricity

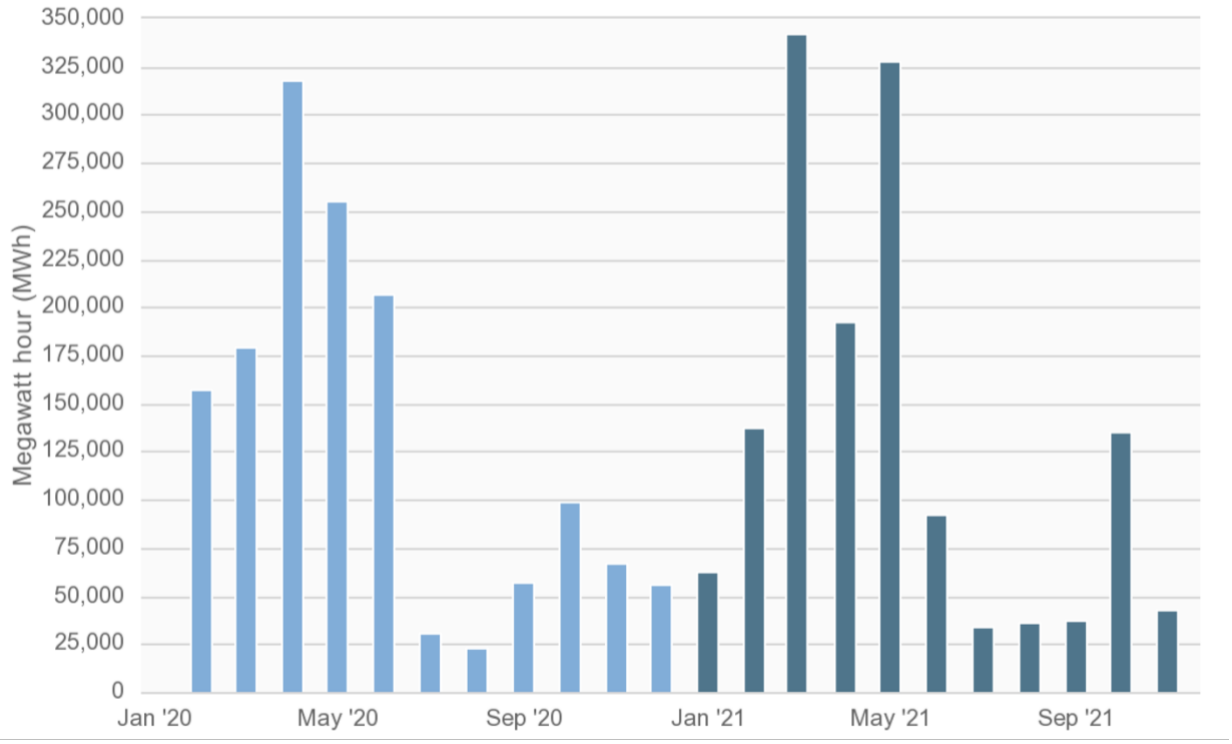
[41] *Ibid.*

[42] SB 100 Joint Agency Summary (2021) at p. 10; https://efiling.energy.ca.gov/GetDocument.aspx?tn=239588&DocumentContentId=73021

just 12.5 MW over the last 20 years[43], representing just 0.2% of the **annual future *expansion*** of renewables in this state.

So much renewable energy has come online that, "sometimes, during the middle of the day, California's renewable resources can generate more electricity than is needed."[44] When that happens, system operator CAISO must direct that wind and/or solar assets be taken offline:

Figure 5: CAISO Renewable Curtailments, 2020-2021[45]



CAISO says that even though some of the threat of overproduction can be solved through Western Energy Imbalance Market exports, "the issue [of renewable curtailment] is expected to intensify in the coming years" as the pace of renewable deployment increases.[46] One of CAISO's solutions to curtailment is to "reduce minimum operating levels for *existing generators*, thus making room for more renewable production."[47]

One major effect of the increase in renewable generation is seen in the "duck curve" — a chart that depicts the increasing share of generation provided by renewables in the middle of the day. Here is one example from the middle of May 2021:

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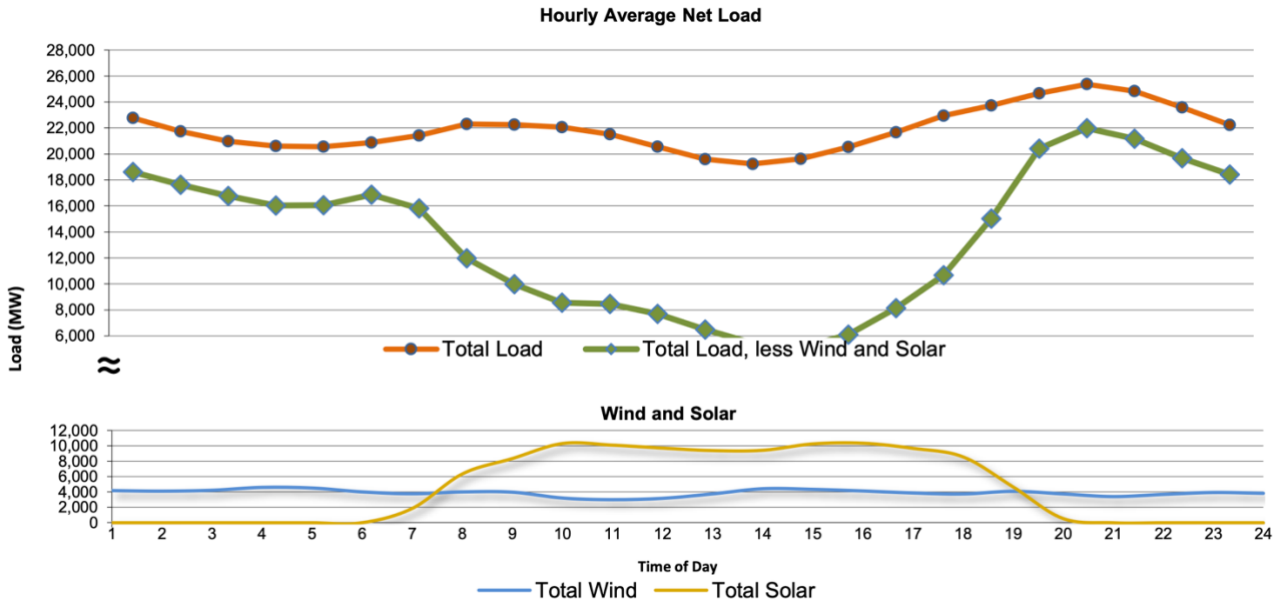
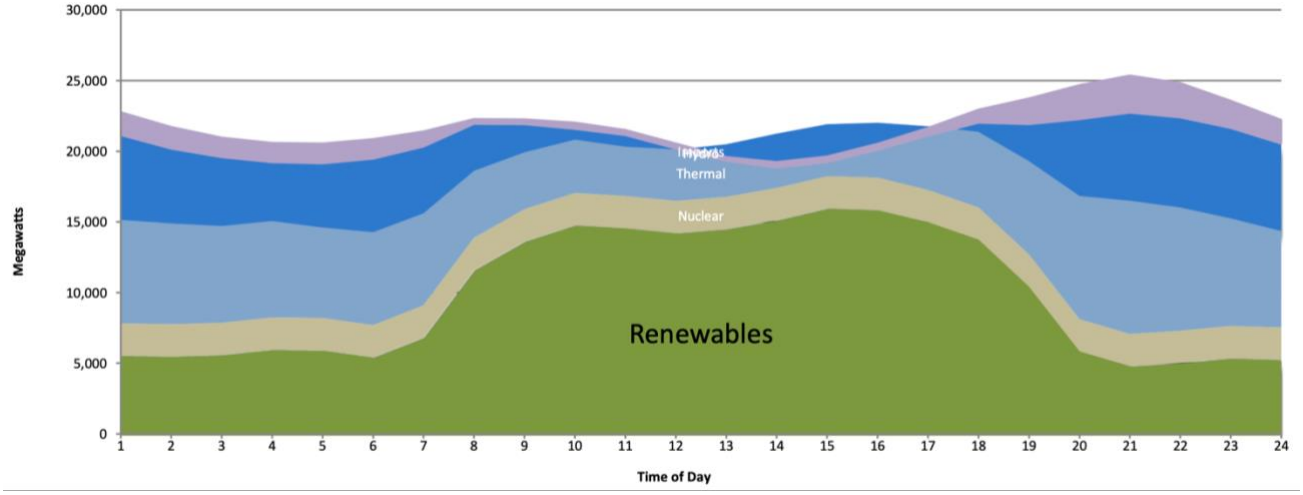
[43] See post, Figure 13: KR3 Mean Annual Generation, 2001-2020, p. 20
[44] http://www.caiso.com/informed/Pages/ManagingOversupply.aspx
[45] *Ibid.*
[46] http://www.caiso.com/Documents/CurtailmentFastFacts.pdf
[47] http://www.caiso.com/Documents/ManagingOversupply-Solutions.pdf

Figure 6: Duck Curve, May 15, 2021 (CAISO)[48]



Another way to look at the same day's data:

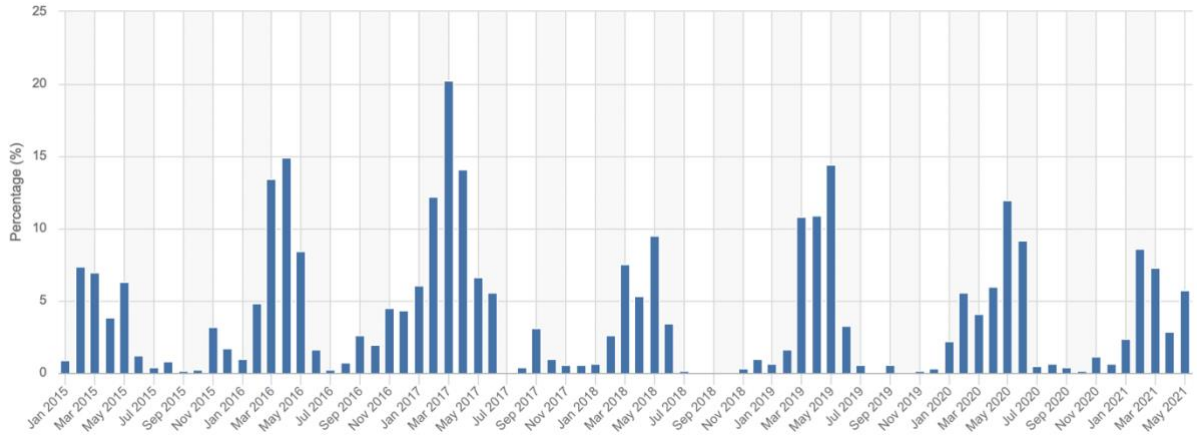
Figure 7: Generation by Resource Type (CAISO)[49]



When there is a threat of overgeneration to the grid, the CAISO market signals generators to stand down by pushing prices very low or even negative — at which point the generator must pay to participate in the market.

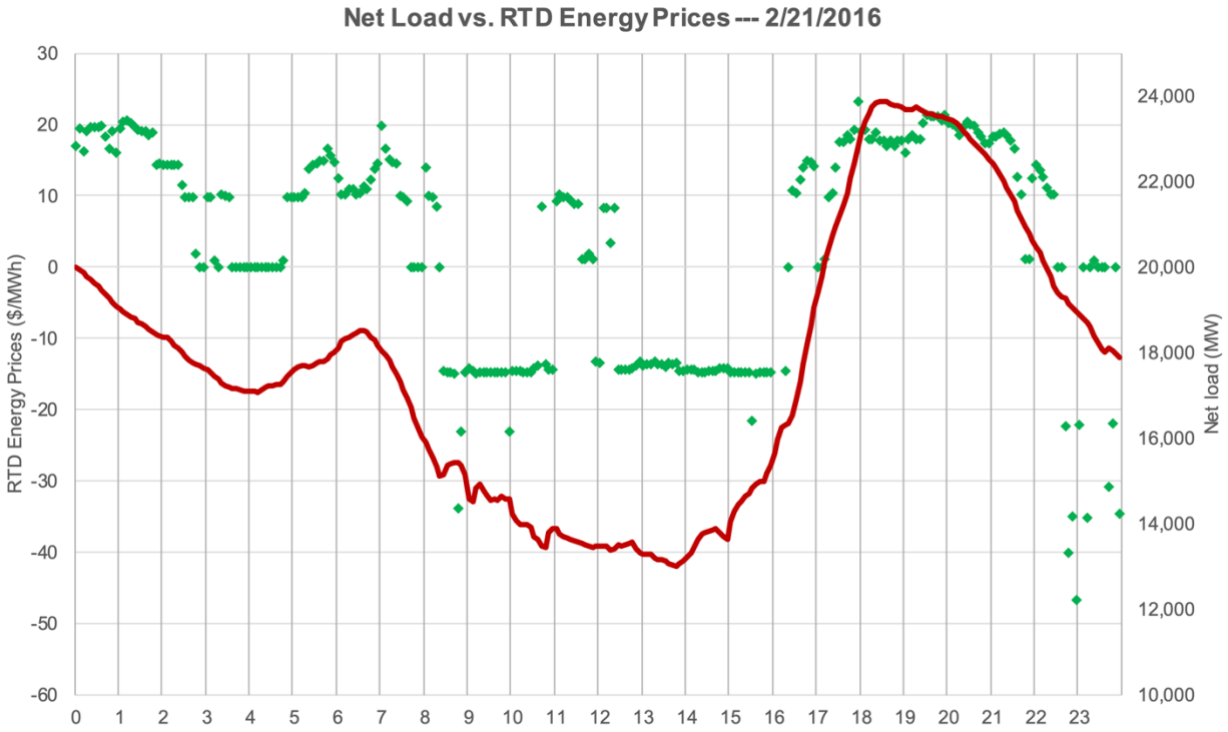
[48] http://content.caiso.com/green/renewrpt/20210515_DailyRenewablesWatch.pdf
[49] *Ibid.*

Figure 8: Frequency of Negative Market Prices 2015-2021 (CAISO)[50]



Here's one example of the interrelation between the duck curve and market energy prices:

Figure 9: Duck Curve and Energy Prices (CAISO)[51]



For purposes of this proceeding, the take-away should be that there are certain predictable times — times of day, times of the week, and times of the year — when the marginal usefulness of energy generation to our society is relatively low. Both through its regulatory mechanisms and its market pricing, our society routinely signals that energy

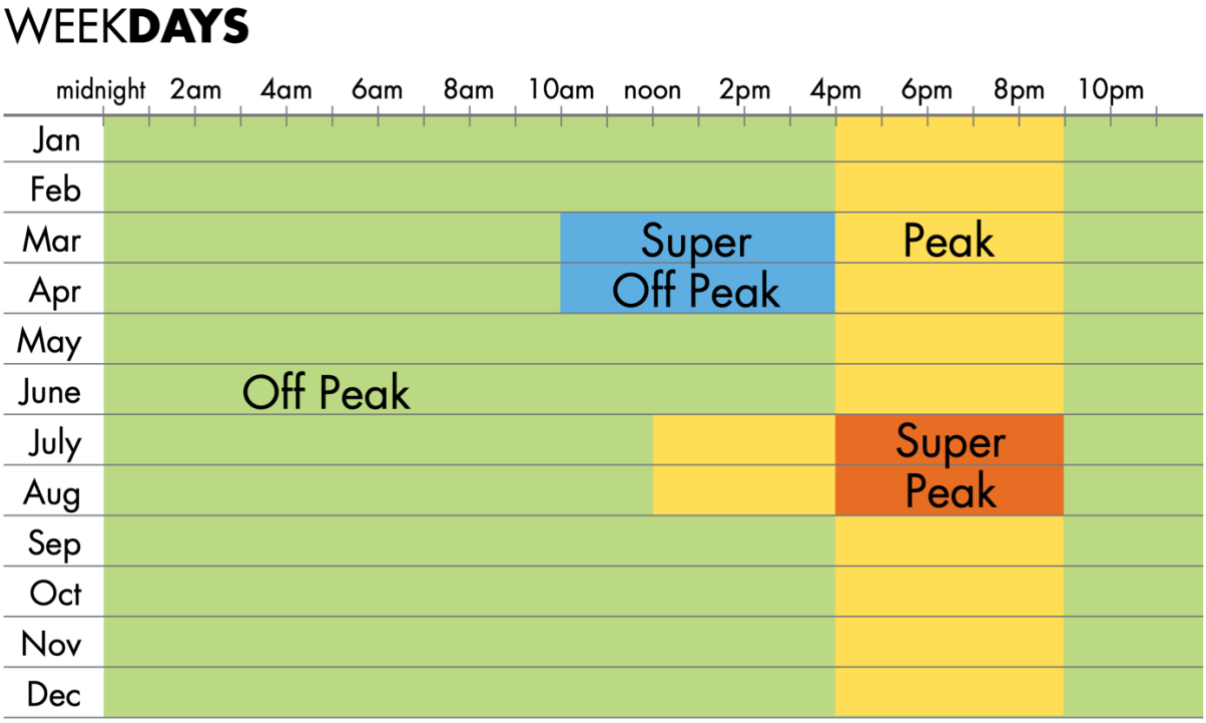
[50] http://www.caiso.com/Documents/MonthlyRenewablesPerformanceReport-May2021.html ["negative prices" tab]

[51] http://www.caiso.com/Documents/CaliforniaISOProposedTime-of-UsePeriods-CPUC_2_26_2016_9am.pdf at slide 14

production is relatively un-useful (low generation prices, rate-encouraged demand) or even potentially harmful (negative prices, curtailment). CAISO has studied and identified these times, and characterizes them as "Super Off Peak" periods.[52] They occur, predictably, at times when generation from renewables is at its peak and generation from more traditional sources threatens the grid with overproduction, leading to low or negative pricing and forced renewable curtailments.

CAISO has conservatively identified "super off peak" times as occurring (1) from 10 a.m. to 4 p.m. on all weekdays in March and April, and (2) from 10 a.m. to 4 p.m. on all weekends and federal holidays from September through June:

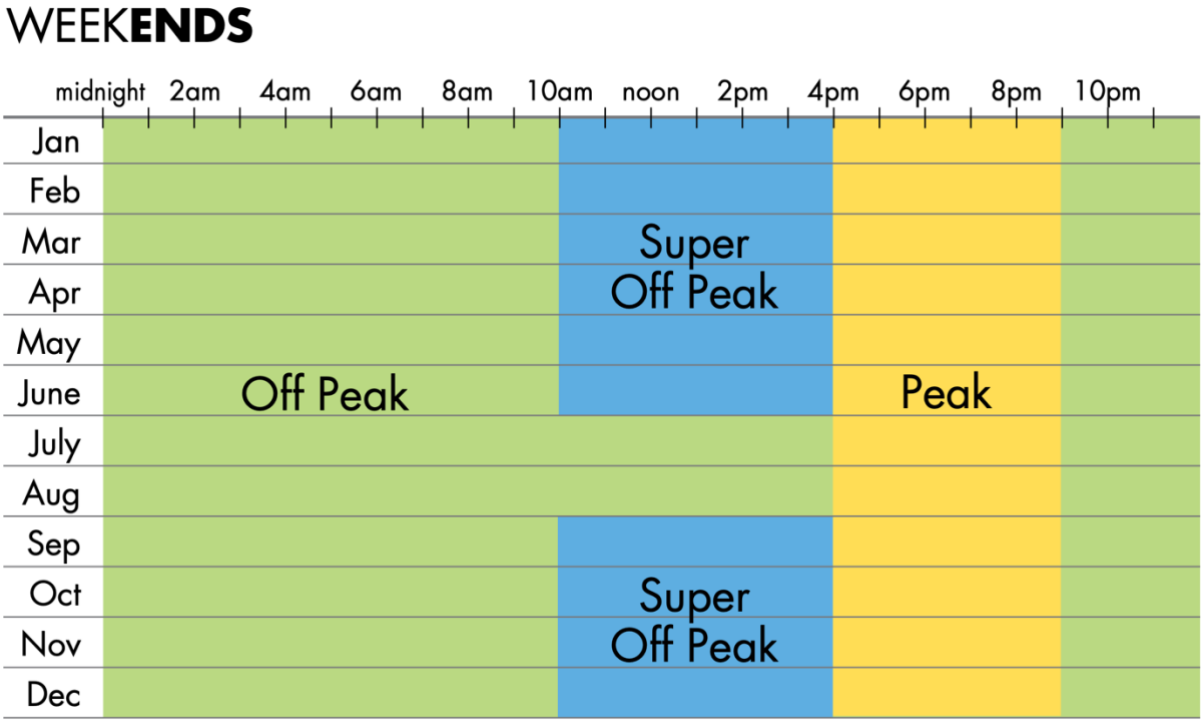
Figure 10: CAISO "Super Off Peak" Periods, Weekdays[53]



[52] http://www.caiso.com/Documents/MatchingTimeOfUsePeriodsWithGridConditions-FastFacts.pdf

[53] http://www.caiso.com/Documents/CaliforniaISOProposedTime-of-UsePeriods-CPUC_2_26_2016_9am.pdf at slide 8

Figure 11: CAISO "Super Off Peak" Periods, Weekends[54]

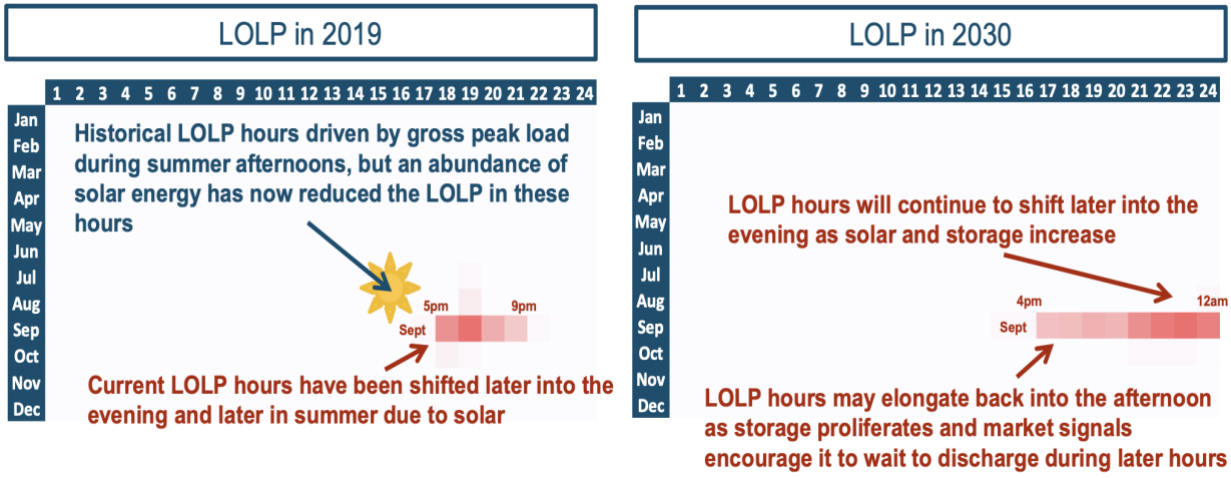


CAISO established these super off peak periods conservatively, because net peak demand (load minus solar and wind, the more critical peak from a resource adequacy viewpoint) has already moved to between 7 and 9 p.m. due to increasing renewable penetration in the five years since CAISO established its TOU periods.[55] Net peak demand (where loss of load probability ["LOLP"] is greatest) will only move later and later into the evening over the course of any new license for this project:

[54] *Ibid.*

[55] http://www.caiso.com/Documents/2021-Summer-Loads-and-Resources-Assessment.pdf at p. 36

Figure 12: Loss of Load Probability, 2019-2030 (CAISO)[56]



The social utility of the energy generated by this project's dewatering of the NFKR — *i.e.*, the market's marginal need for energy derived from that encumbrance — is relatively lower during "Super Off Peak" periods of time than at others — and at some of these times, as we have seen, its social utility goes negative. The duck curve, the solar glut, the explosion of renewables, low and negative market pricing, renewable curtailments, and time-of-use demand enticements all conspire in support of this conclusion. Given the need to balance developmental and nondevelopmental values towards the most beneficial social use of the Wild and Scenic NFKR, super off peak periods of time are ripe for additional curbs on project operations for increased environmental and recreational mitigation, as the best social use of this amazing resource swings far away from power generation towards more natural competing uses.

4.6.2. Current Net Investment

Edison: *The current net investment for the Project as of July 2021 represented by the net book value is $28.3 million.* (PAD at p. 4-23.)

KRB: Net Investment reflects sunk costs. A more salient financial metric of the project's worth (but not its externalized social costs) would be the takeover cost based on the forward-looking value of energy production at this project.

4.6.3. Project Generation and Outflow Records

Edison: *the estimated dependable generating capacity of the Project is 36.8 MW*. (PAD at 4-24.)

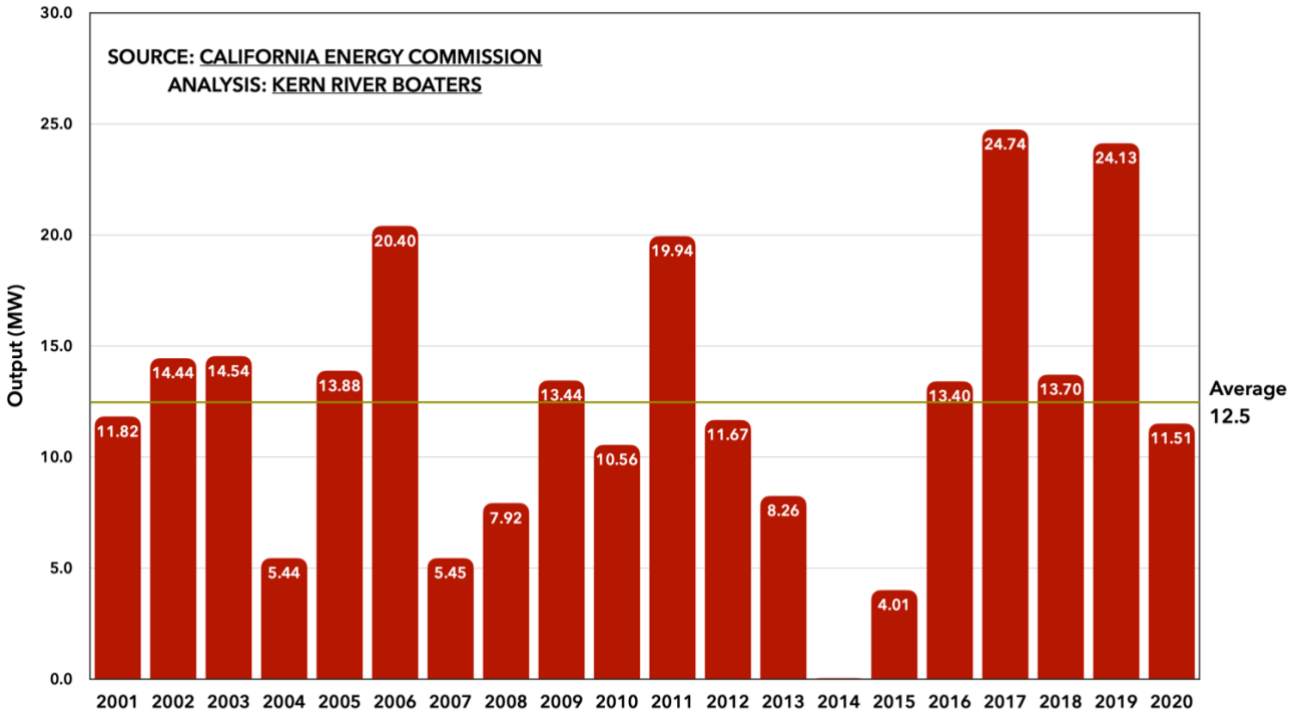
KRB: Edison conflates the project's operating capacity with its dependable capacity. The "operating capacity" of the project — the maximum output of the system (two full

[56] https://www.caiso.com/Documents/E3-CAISODemandResponseELCCStudyUpdate2021-Combined-.pdf at p. 19

penstocks and two Francis-reaction generators) — is 36.8 MW. (PAD at 4-10.) The "dependable" capacity of the project is much, much lower. Both the 1996 EA and 1996 License Order[57] found that the project's "dependable capacity" was "about 7.71 MW."[58]

The project's mean annual rate of output since 2001 has been about a third of its capacity, or 12.5 MW, with large fluctuations from zero (2014) to just under 25 MW (2017)[59]:

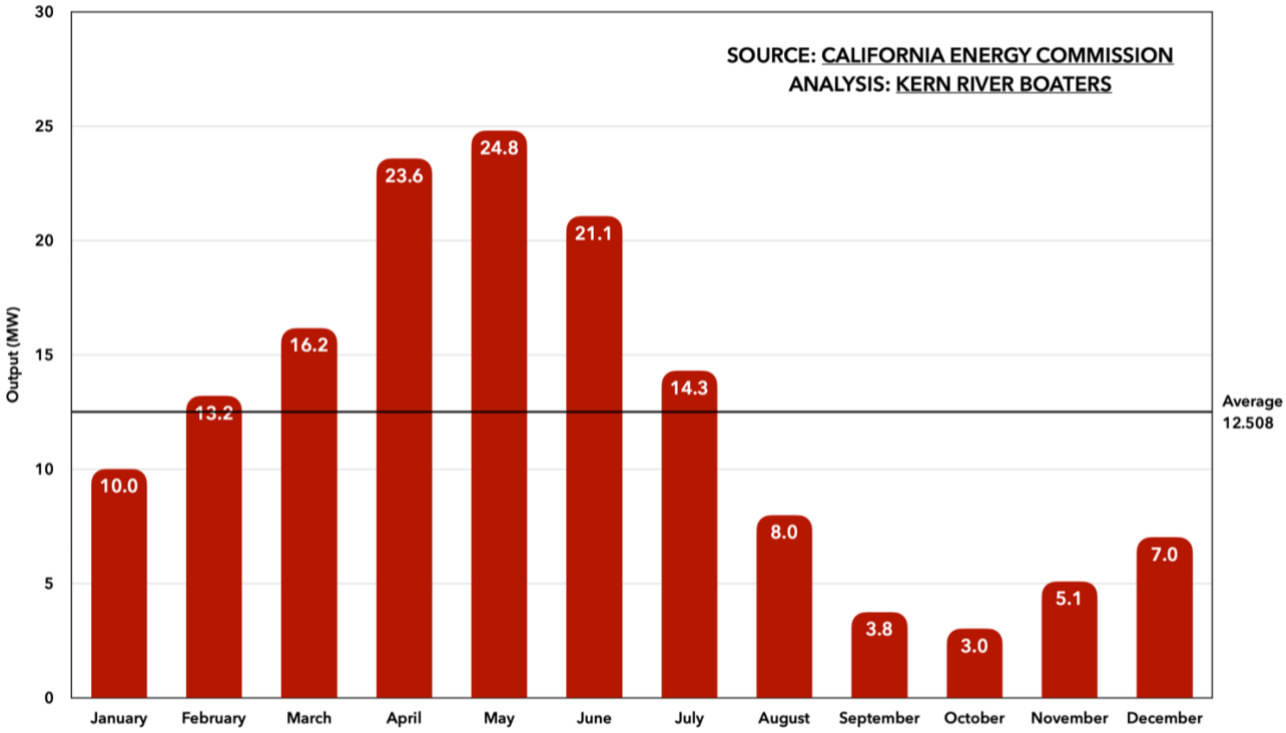
Figure 13: KR3 Mean Annual Generation, 2001-2020



Seasonal fluctuations are also strong, with mean variations from 3 to 25 MW:

[57] 77 FERC ¶ 61,313; https://www.kernriverboaters.com/s/1996_kr3_license.txt
[58] 1996 EA at p. 78 & 1996 License Order at p. 32
[59] https://ww2.energy.ca.gov/almanac/renewables_data/hydro/index_cms.php

Figure 14: KR3 Mean Monthly Generation, 2001-2020

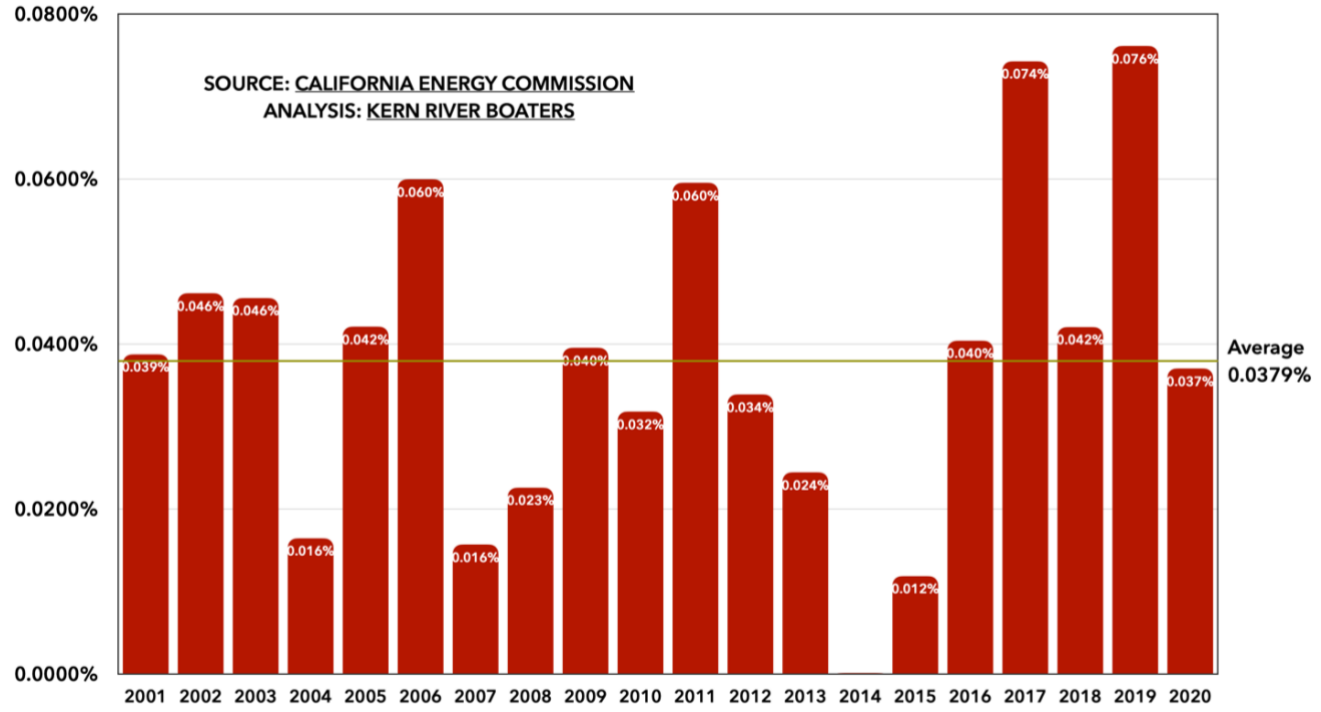


There are also strong intra-daily fluctuations in project output when incoming flows are insufficient to completely fill the conveyance. The larger the day's diurnal, the larger the fluctuation. Diurnal fluctuations are not captured in the publicly available USGS data for the project, which only provides average daily flows.

KR3 inarguably played a much larger role in this state's electrical production when it was built than it does today. While state production has grown by orders of magnitude in that century — the state's "electrical population" was less than 3 million people in 1921[60] — the capacity of KR3 has not appreciably changed. From 2001-2020, the project accounted for 0.34% of in-state hydroelectric generation, and just 0.038% of total state generation:

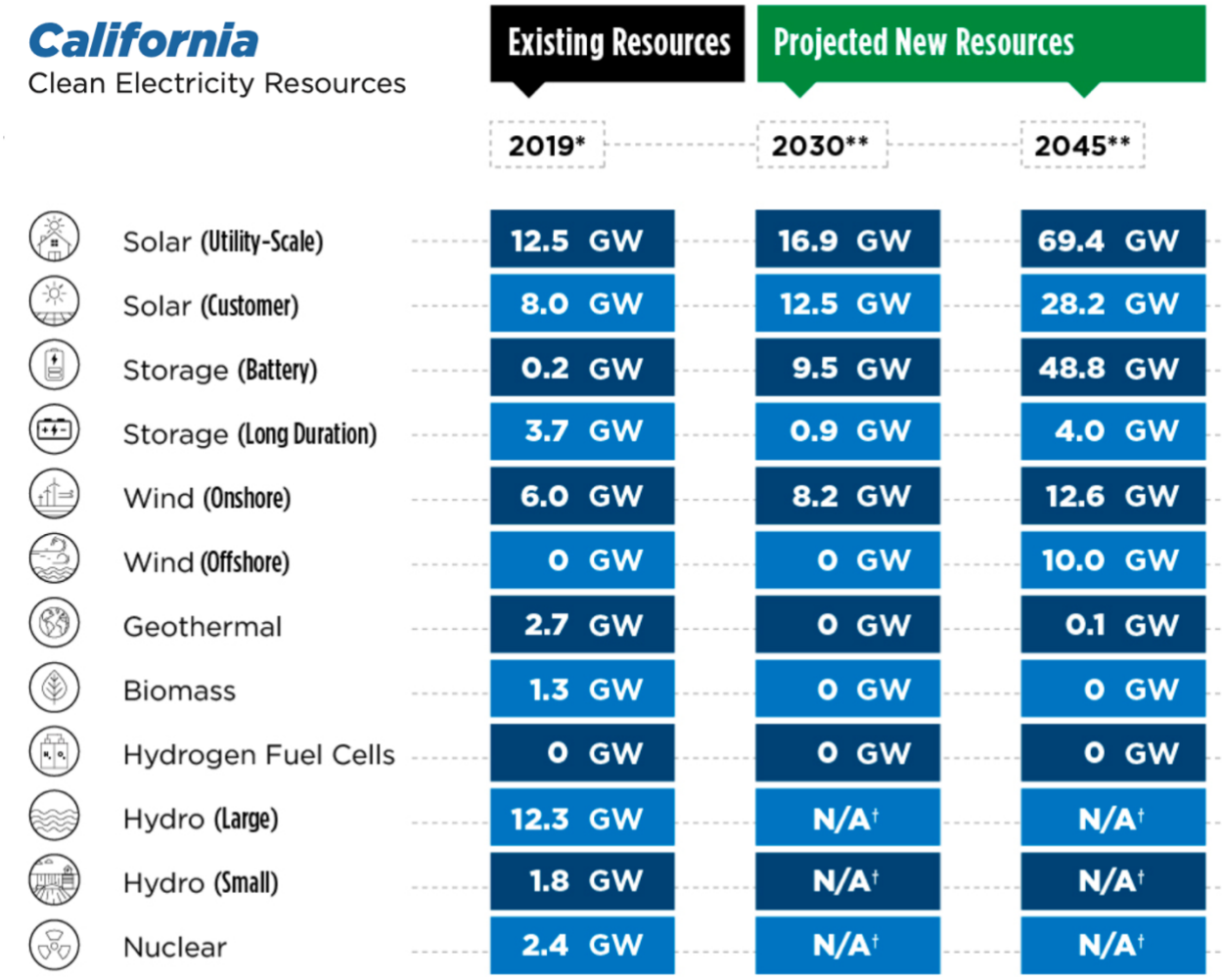
[60] https://gizmodo.com/a-map-of-which-state-had-the-most-electricity-in-1921-510778946

Figure 15: KR3 Contribution to California Electricity, 2001-2020



That percentage is only going to shrink during the term of a new license. According to the 2021 SB 100 Joint Agency Report, the output of KR3 will be further dwarfed by more modern, more rational, and less environmentally destructive technologies:

Figure 16: Renewables in California, 2019-2045[61]



**Includes in-state | **Includes in-state and out of state capacity | †New hydro and nuclear resources were not candidate technologies for this round of modeling and could not be selected*

5.2.3.2. Existing Flow Gages

Edison: *Gage data are published annually on the U.S. Geological Survey (USGS) website. USGS maintains a contract with SCE to annually review Project streamflow records at the USGS gages to satisfy the Project's FERC license requirements.* (PAD at p. 5-22.)

KRB: As noted above (see *ante* at § 4.4.4.2), USGS does not publish data to the public sufficient to establish Edison's compliance with instantaneous license requirements.

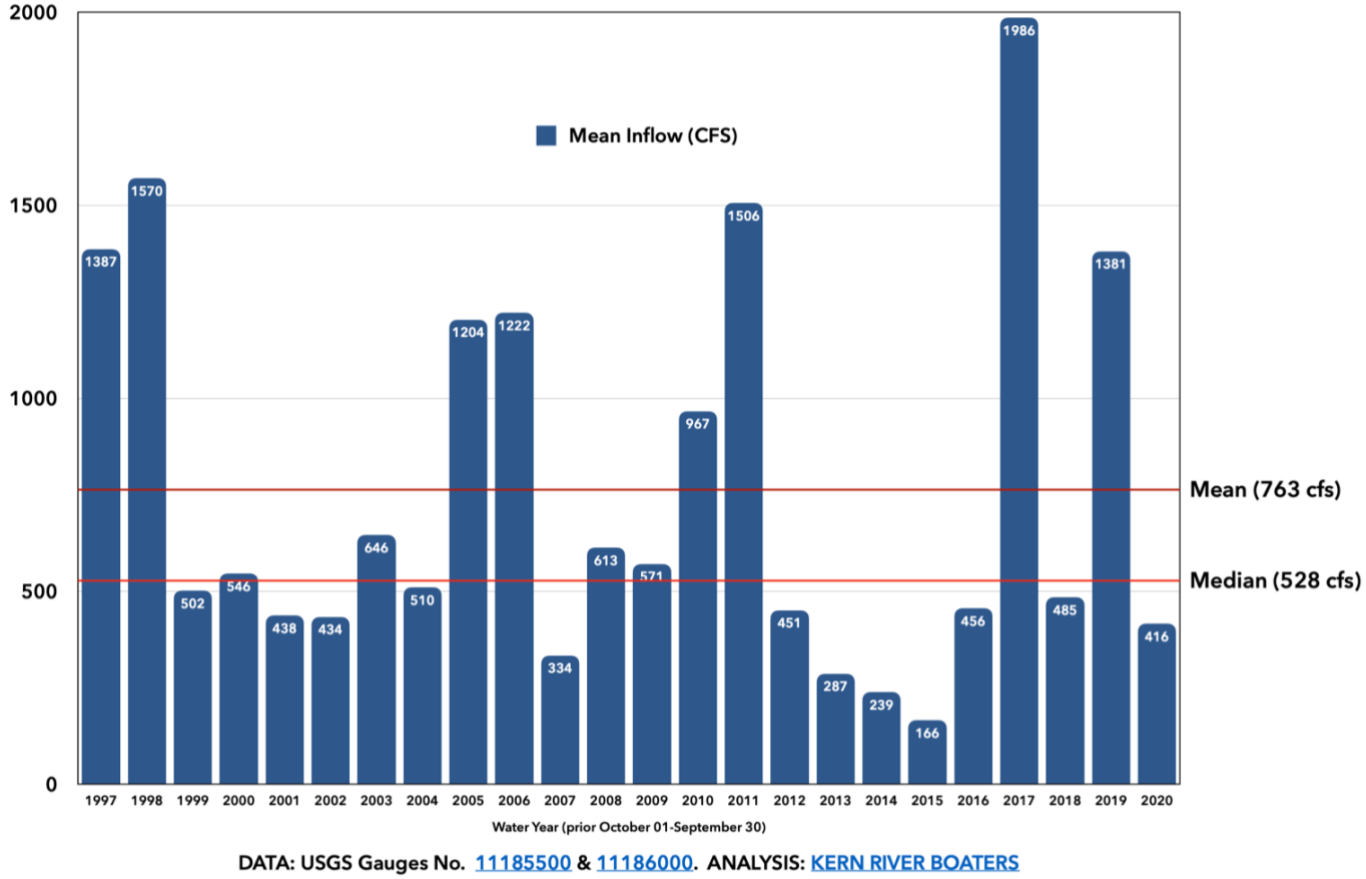
[61] 2021 SB 100 Summary at p. 10; https://efiling.energy.ca.gov/EFiling/GetFile.aspx?tn=237167&DocumentContentId=70349

5.2.3.3. Hydrology

Edison: *Flow data are available to assess watershed hydrology from the two Project gages at the Fairview Dam Bypass Reach and the KR3 water conveyance system over the period of record (POR) (1960–2019), including the current license period (i.e., water year 1997, beginning October 1, 1996, through water year 2019, ending September 30, 2019).* (PAD at p. 5-22.)

KRB: Edison's POR is bookended by two consecutive high water years on the front end (1997 and 1998) and two of three years on the back end (2017 and 2019):

Figure 17: Mean Inflow at Fairview Dam, 1997-2020[62]

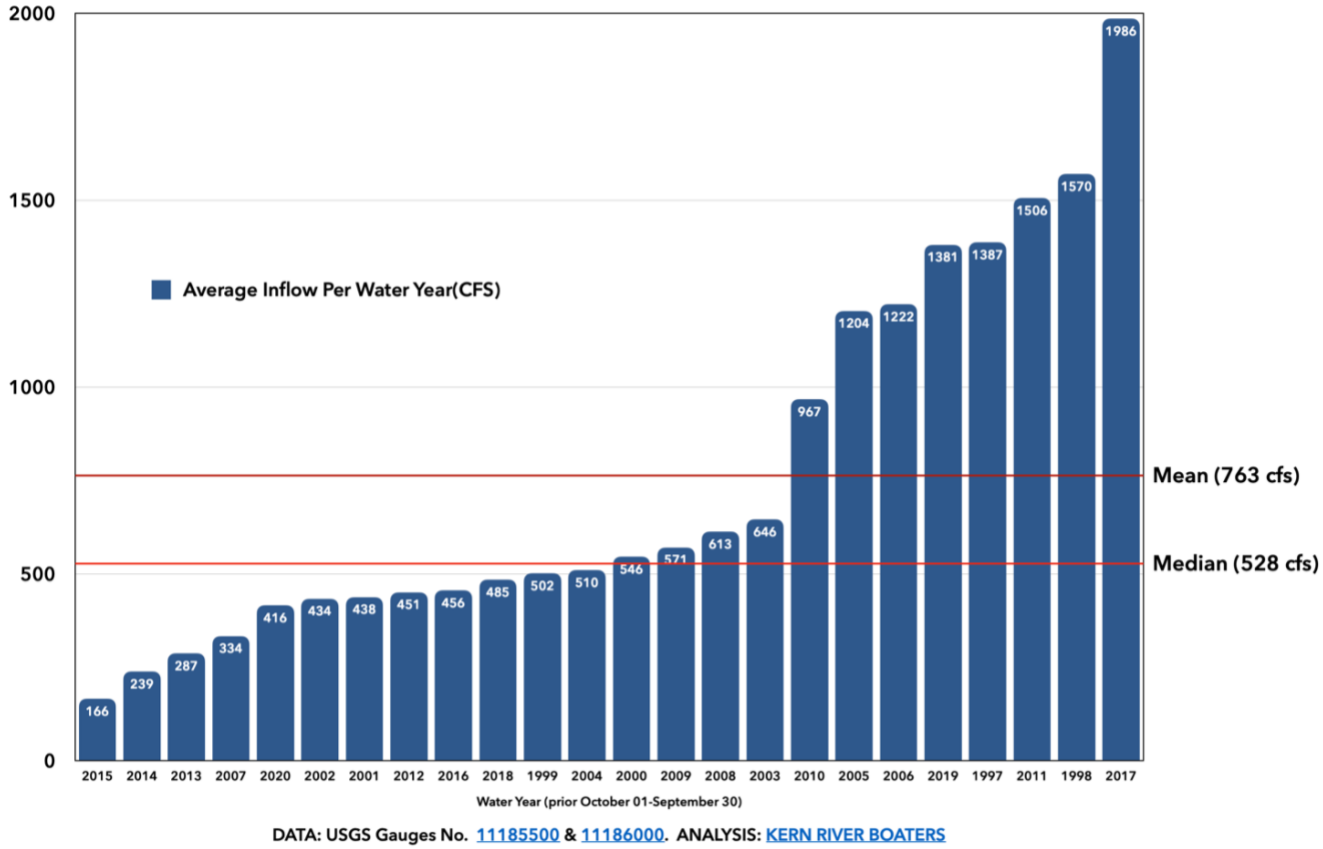


Data for water year 2020 — a dry year, which Edison chose not to include — has been available at USGS, and KRB includes it. The figure above illustrates a wide range of values between water years, from a mean flow of 166 cfs at Fairview Dam in the lowest year to a mean more than an order of magnitude greater in the highest: 1,986 cfs.

When water years are ranked, it becomes apparent that the data set does not constitute a standard distribution, but rather is skewed by outlier wet years:

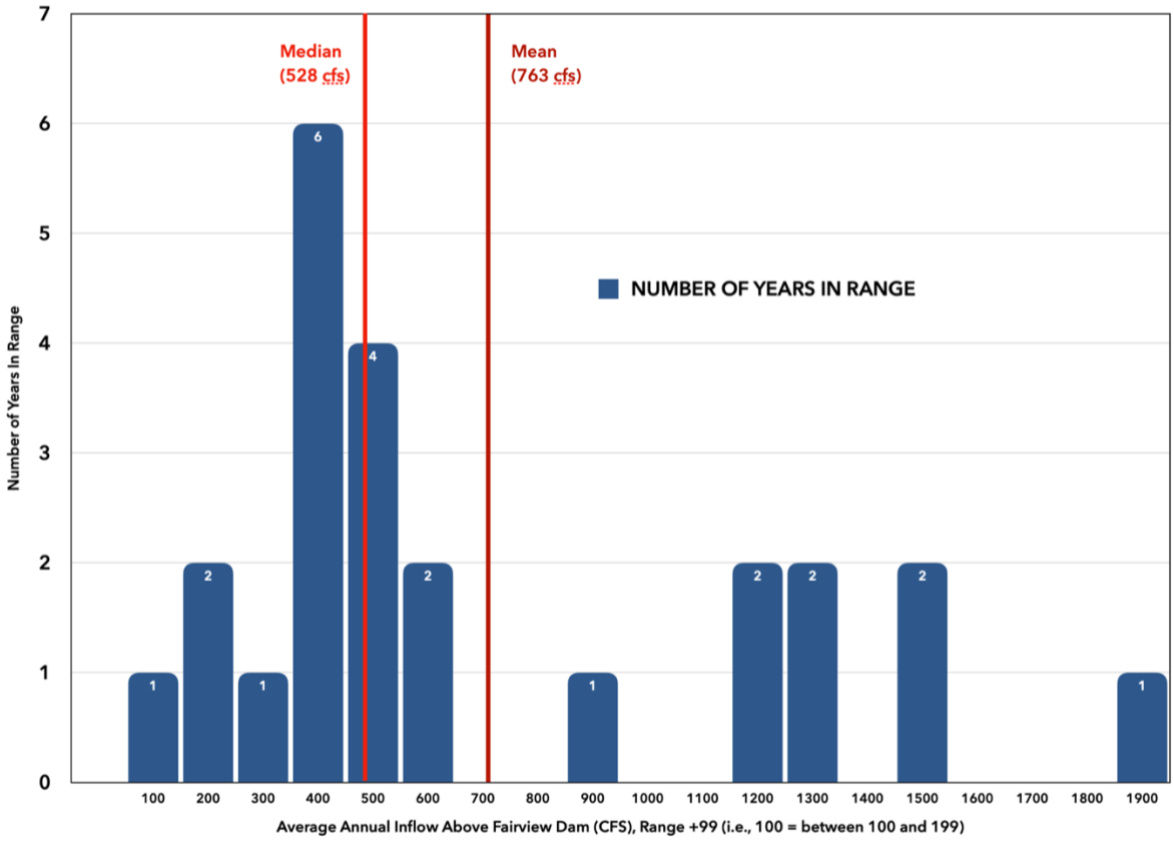
[62] Flow data from USGS gauges 11185500 & 11186000; see *supra*, § 4.4.4.2. Gaging Stations

Figure 18: Mean Inflow at Fairview Dam 1997-2020, Ranked



The skewed nature of this data set is further demonstrated by a distribution chart:

Figure 19: NFKR Distribution of Water Years, 1997-2020

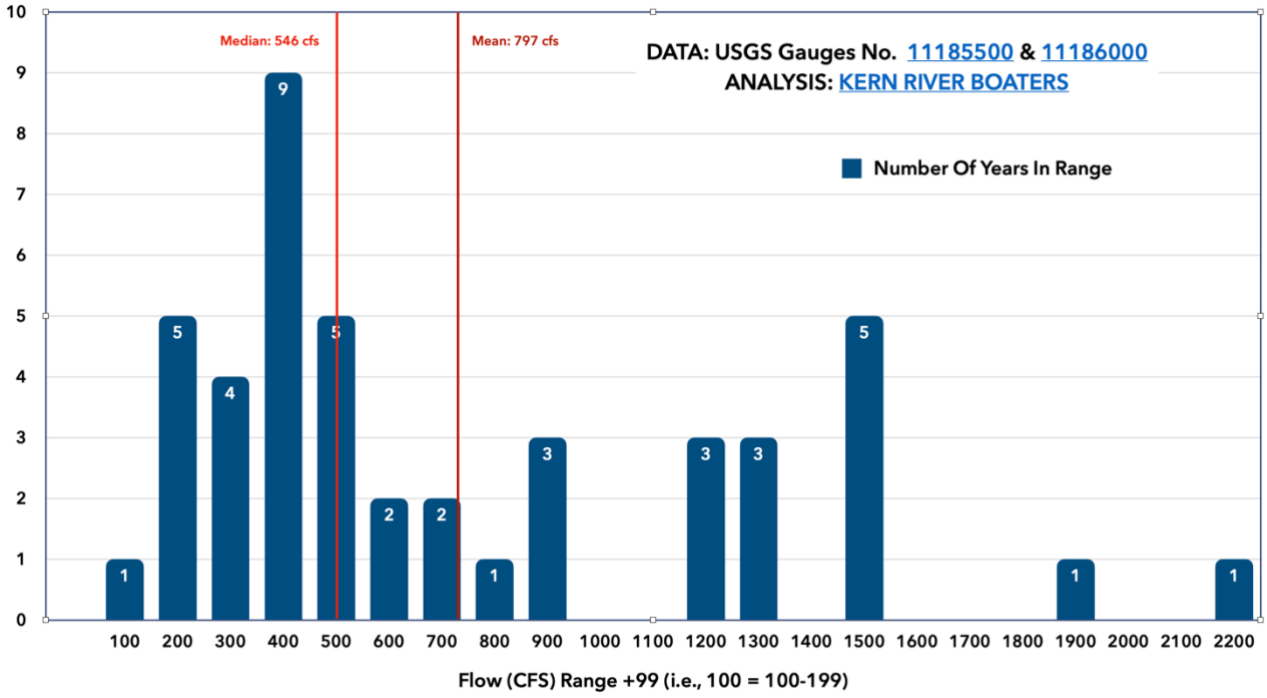


In a data set with a normal distribution, values are distributed symmetrically, tapering away evenly from both sides of the center. In a normal distribution, the statistical mean, mode, and median are generally in line.

The NFKR water year data set is not a normal distribution. It is highly variable and skewed by outliers on one side — the "wet," high water side. The mean and the median are not in line; rather, there is a significant delta between the mean NFKR inflow (763 cfs) and its median (528 cfs) over the current license period. When confronted with such a skewed distribution, the median value is the best measure of the system's central tendency.

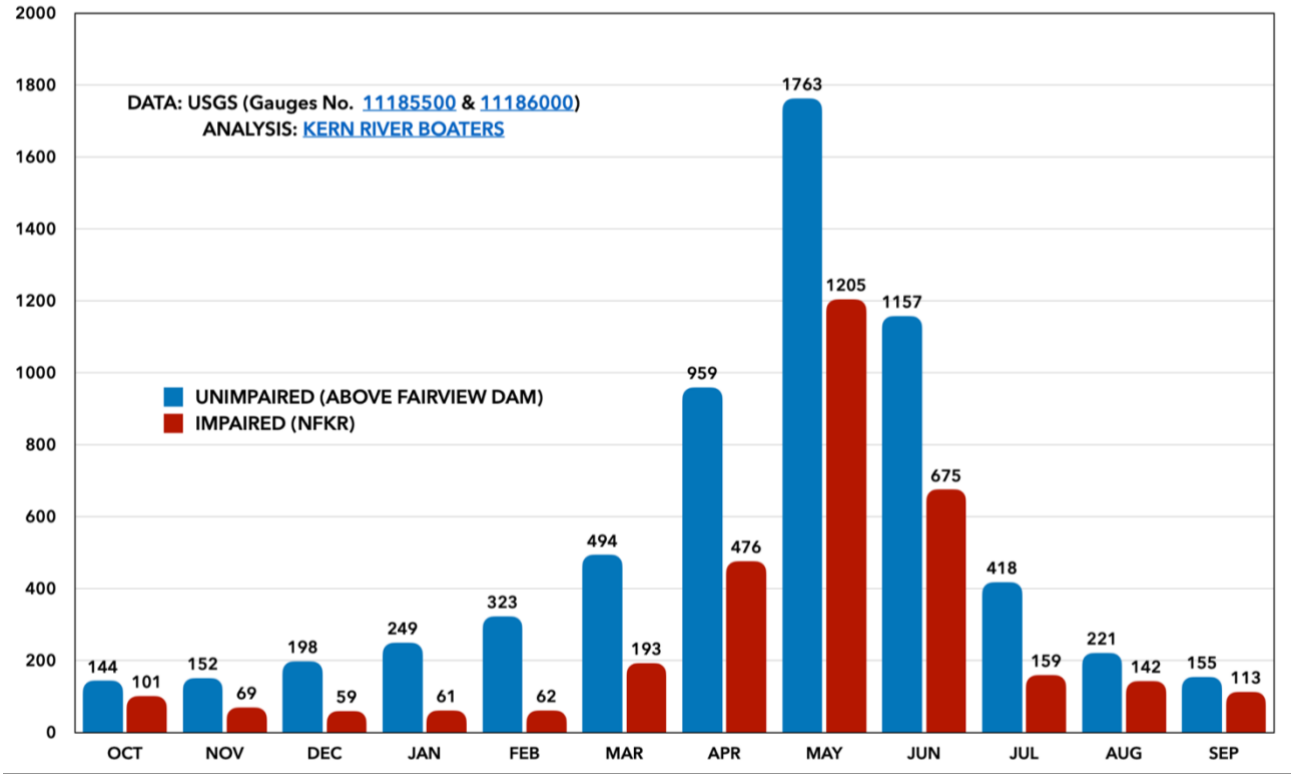
The skewed nature of this data set is not an abnormal or recent occurrence on the NFKR. Extending the data set back as far as continuous USGS data at Fairview Dam is available (1976), a similar distribution appears:

Figure 20: NFKR Distribution of Water Years, 1976-2020



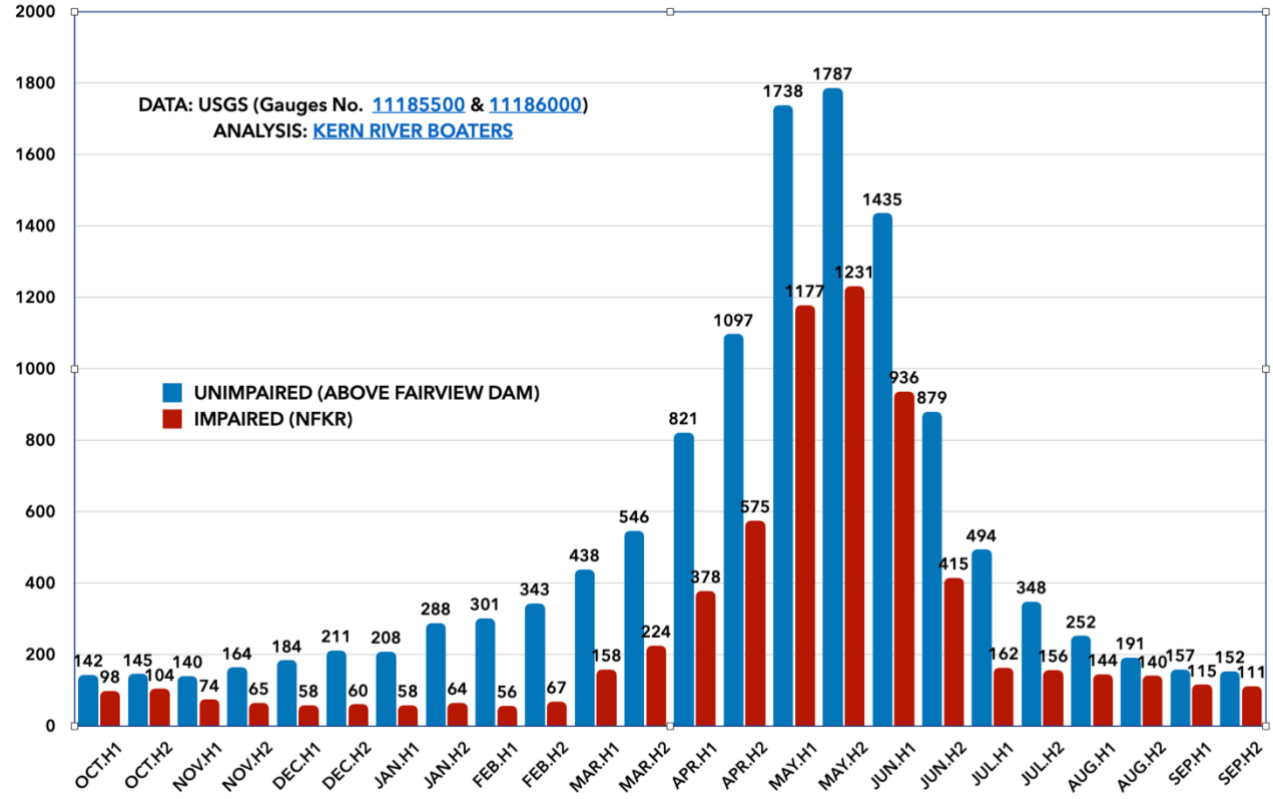
Edison: *Comparison of Unimpaired and Regulated Flows.* (Pad at p. 5-24, *et seq.*)
KRB: The opposite of "unimpaired" is "impaired," not "regulated." Indeed, the project has no storage (PAD at pp. 3-5, 3-10 & 4-3) and can serve no flood control or other regulatory purpose. Flows below Fairview Dam are impaired by project operations. That being the case — and the median being the best representation of the central tendency of this watershed — KRB calculated median flows by month for water years 1997-2020:

Figure 21: NFKR Median Flows (cfs) 1997-2020, By Month



Here is a look at the same data, broken down into half-months:

Figure 22: NFKR Median Flows (cfs) 1997-2020, By Half-Month

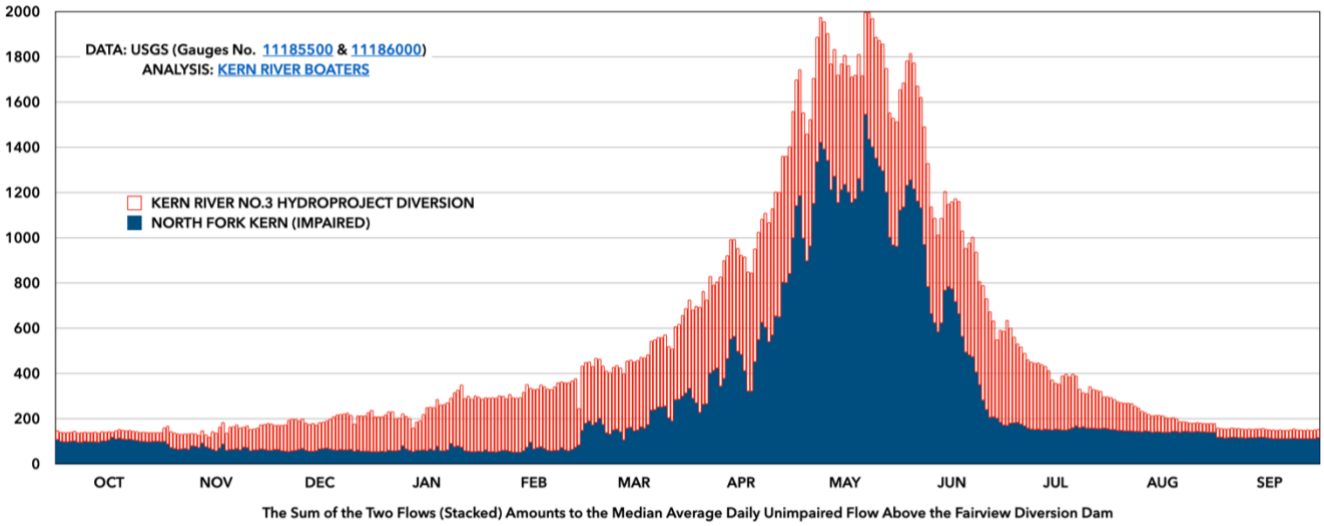


Note again that these figures are derived from USGS data that does not reflect the peak of the daily diurnal, which many boaters use to gauge the water level.

Use of these figures as a predictor of future project effects is confounded by the fact that the project was offline for 1,455 days of the 8,766-day data set. It cannot be said from the USGS data how many additional days the project was operating at only partial capacity with respect to incoming flows at Fairview Dam, but, as a start, there are 317 days during the present term when Edison diverted less than a quarter of available flows (accounting for the MIF). Days partially offline with respect to the diversion, like days completely offline, confound any analysis of the project's future effect on the environment or recreation that is based solely on past performance.

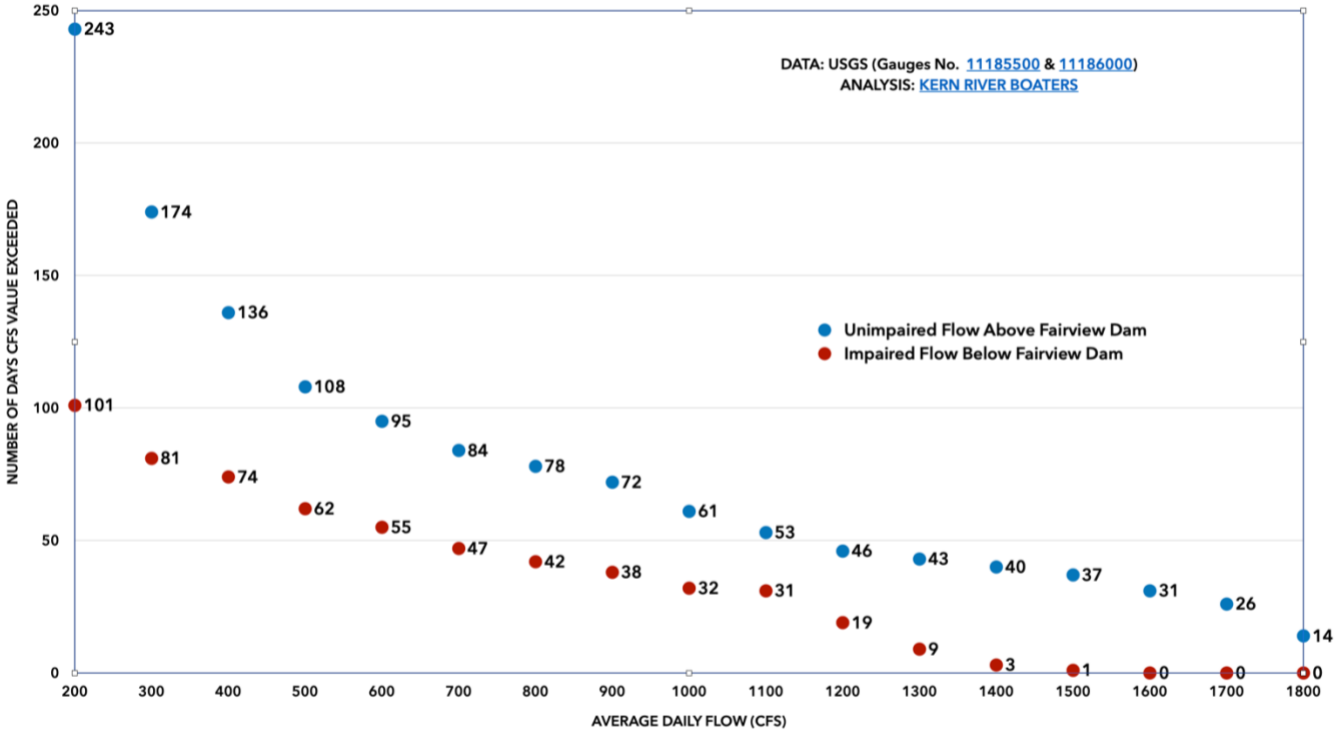
Another way of looking at project effects is to graph the median flow for each day of the year in the data set:

Figure 23: NFKR Median Daily Flow (cfs), 1997-2020



Each of the three graphs above (*Figure 21, Figure 22 & Figure 23*) demonstrate the three main effects of the project on whitewater recreation: (1) artificially capped peak flows at the height of the runoff (late April to early June); (2) the removal of low-optimal shoulder season flows (March, April, and June), and (3) the complete removal of enjoyable perennial flows for the balance of the year (July-February). The data in *Figure 23* can also be represented as an exceedance chart:

Figure 24: NFKR Median Exceedances, 1997-2020



The project's effects on peak flows can be seen on the right half of *Figure 24*; its effects on shoulder flows can be seen left of center; and its effects on enjoyable perennial flows can be seen on the left. Note again that these figures do not reflect peak diurnal flows. These figures also fail to capture the full impact of KR3 on NFKR recreation because the project was offline for 1,455 of the 8,766 days of the data set and partially offline for at least hundreds more.

5.2.3.5. Instream Uses of Water

Minimum Instream Flow

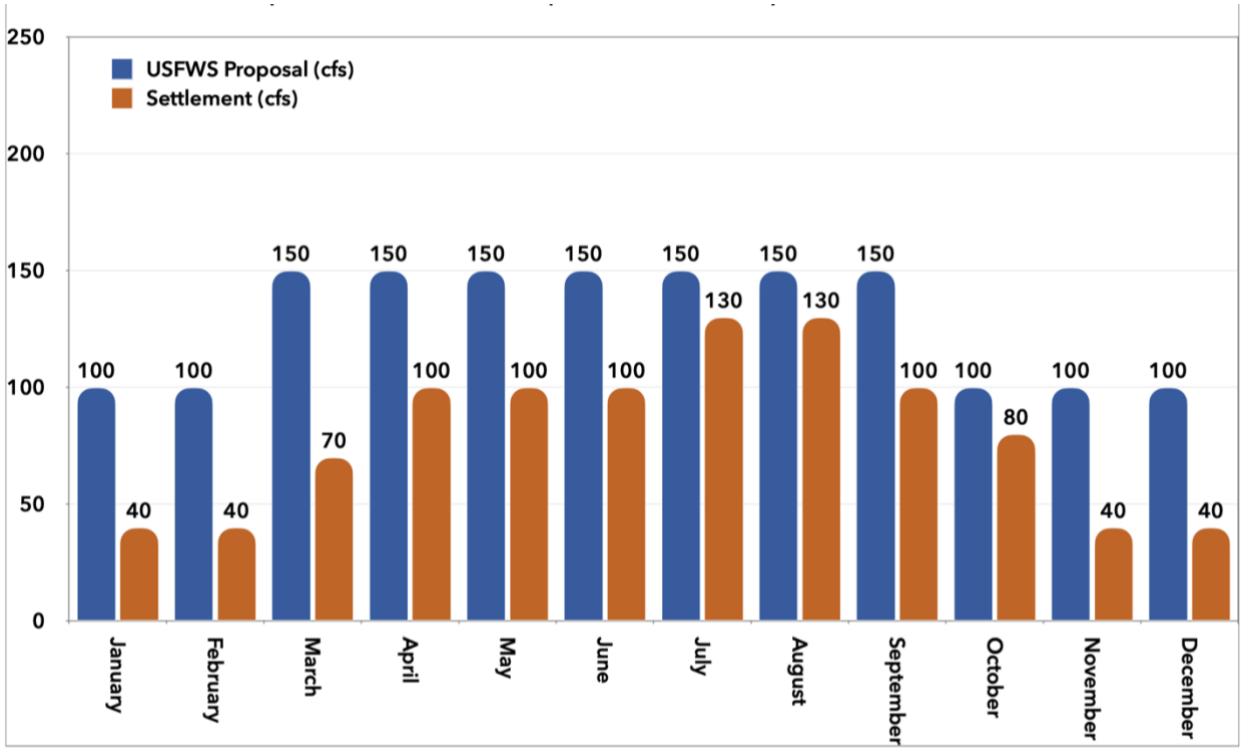
Edison: *SCE diverts 35 cfs year-round . . . to provide cooler water to the California Department of Fish and Wildlife's (CDFW) Kern River Planting Base Hatchery.* (PAD at p. 5-37.)

KRB: This statement is false. The diversion of 35 cfs was designed to afford Edison the ability to generate power; the hatchery does not require more than 25 cfs, and has been closed since December 2020, while Edison continued to divert the first 42-43 cfs at Fairview Dam, at great detriment to the natural fishery below. (See *supra* at § 3.7. Major Water Uses & *post* at § 5.3.3. Aquatic Habitat.)

Edison: *[M]inimum instream flow requirements downstream of Fairview Dam range from 40 to 130 cfs.* (PAD at p. 5-37.)

KRB: In the last proceeding, USFWS proposed a significantly more robust MIF:

Figure 25: Comparison of KR3 Fish Flow Requirements, USFWS v. Settlement[63]



The current minimum instream flow requirements are the negotiated product of a settlement agreement, which lowered the MIF by 37% in exchange for a trust fund. The managing agencies will find during this proceeding that many anglers do not believe the trust fund has been worth the cost to the natural fishery in a lower MIF — a cost borne by both the health of the fishery and angler enjoyment of it.

Whitewater Recreation Flows

Edison: *Whitewater recreation flows are required to be discontinued for each day the California Independent System Operator or its successor declares a Stage II or greater power emergency*. (PAD at p. 5-37.)

KRB: We note that no such event has transpired during a rec flow day over the course of the license. Further, peak net loads in California generally occur from mid-July to early September[64] — times of the year when KR3 does not operate anywhere near its full capacity.[65]

[63] 1996 EA at p. 81.

[64] http://www.caiso.com/Documents/CaliforniaISOPeakLoadHistory.pdf

[65] See *ante*, Figure 14: KR3 Mean Monthly Generation, 2001-2020

5.2.4. Water Quality

Edison: *[T]emperatures vary seasonally from lows during peak snowmelt period to highs at or above 20 degrees Celsius (°C) in late summer¸ including upstream of the Fairview Dam Bypass Reach.* (PAD at p. 5-38.)

KRB: Temperatures above Fairview Dam rise beyond 20C sometimes, thereby threatening the health of the fishery. However, the threat is demonstrably greater below Fairview Dam, where more fish die than above due to a combination of an inadequate MIF and the first-in-priority minimum generation flow. (See *post* at § 5.3.3. Aquatic Habitat.)

5.2.4.1. Water Quality Objectives from Basin Plan

Edison: *Project operations have not been identified as sources of water quality impairment but may influence coliform counts in the river¸ which have occasionally been higher than Basin Plan objectives* . . . . (PAD at p. 5-39.)

KRB: Project operations influence coliform counts: the project removes water from the riverbed that would otherwise assist in diluting bacteria as it travels through the dewatered reach. As the United States Supreme Court has observed: "In many cases, water quantity is closely related to water quality; a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation or, . . . as a fishery. In any event, there is recognition in the Clean Water Act itself that reduced stream flow, *i.e.*, diminishment of water quantity, can constitute water pollution. First, the Act's definition of pollution as 'the man-made or man induced alteration of the chemical, physical, biological, and radiological integrity of water' encompasses the effects of reduced water quantity. This broad conception of pollution — one which expressly evinces Congress' concern with the physical and biological integrity of water — refutes petitioners' assertion that the Act draws a sharp distinction between the regulation of water 'quantity' and water 'quality.' Moreover, . . . the Act expressly recognizes that water 'pollution' may result from 'changes in the movement, flow, or circulation of any navigable waters . . . , including changes caused by the construction of dams.' This concern with the flowage effects of dams and other diversions is also embodied in the EPA regulations, which expressly require existing dams to be operated to attain designated uses. The State may include minimum stream flow requirements in a certification issued pursuant to § 401 of the Clean Water Act insofar as necessary to enforce a designated use contained in a state water quality standard."[66]

[66] *PUD No. 1 v. Wash. Dep't of Ecology* (1994) 511 U.S. 700, 719-720

It is a stated goal of USFS to enhance the water quality of this protected reach of river.[67] It gets few opportunities to do so. The managing agencies should study whether increased flows in the bypassed reach could decrease concentrations of bacteria that threaten public health and thereby increase water quality. The results may dovetail with other information (aesthetics, angler enjoyment, fishery health, enjoyable low-flow boating) supporting (1) increased minimum instream flows and/or (2) a re-prioritization of the MIF over the minimum generation flow.

5.2.4.4. Additional Water Quality Parameters

Dissolved Oxygen

Edison: *The 1993 study found that reduced DO was primarily related to elevated temperature rather than flow, so measures to address elevated water temperatures would also address DO levels.* (PAD at p. 5-46.)

KRB: Edison has elsewhere conceded that quantity of flow *does* affect water temperature (PAD at pp. 5-43 & 5-44), and thus the central "measure to address elevated water temperatures" in service of DO deficiencies would be to further limit its diversion of water into the project in summer months — when water temperatures tend to crest 20C and when the project generates at only a small fraction of its capacity. (See *ante*, *Figure 14: KR3 Mean Monthly Generation, 2001-2020*.)

Fecal Coliform

Edison: *[I]t was suggested that high fecal coliform levels were the result of grazing in the upper reach of Salmon Creek, and recreational use in the NFKR, rather than Project operations. No further investigations into coliform sources or levels were conducted.* (PAD at p. 5-48.)

KRB: Edison's phrase "recreational use" must refer to campers, hikers, and the like. There is no evidence that whitewater recreators contribute coliform in the dewatered reach. Further, Edison earlier conceded that project operations influence coliform counts. (PAD at p. 5-39.) In the prior proceeding, USFS, NPS, and CDFW concluded there was an "environmental concern" about coliform bacteria in the dewatered reach: "At certain times of the year when the flow in the river are low, there appears to be a health concern due to high levels of coliform bacteria."[68] The managing agencies should study whether increased flows in the

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[67] USFS Comprehensive Management Plan, Wild & Scenic Kern (undated) ["USFS CMP WSKR (nd)"] at pp. 46-47; available: https://www.kernriverboaters.com/s/USFS_WILD_SCENIC_NFK_MGMT_PLAN.pdf

[68] USFS, NPS & CDFW Upper Kern Basin Fishery Management Plan (1995) ["1995 USFS UKBF Plan"] at p. V-3; available: https://www.kernriverboaters.com/s/ja_ukb_fmp_1995.pdf

bypassed reach could decrease concentrations of bacteria in service of public and ecological health, especially in the heavily trafficked summer months.

Arsenic

Edison: *Elevated arsenic concentrations were reported in September 1989 NFKR samples downstream of Fairview Dam . . . , but additional sampling in June 1993 reported no detectable arsenic just upstream of Fairview Dam or several miles further upstream . . . . The sources of arsenic in these samples are unknown. Project operations do not contribute arsenic to the NFKR and are not the cause of elevated concentrations.* (PAD at p. 5-48 & 5-49.)

KRB: Edison's conclusion that the project does not contribute to elevated concentrations of arsenic does not follow from its premise. If flows above Fairview Dam are arsenic-free, the project's diversion of a significant portion of these flows likely increases the concentration of arsenic below the arsenic source by removing clean waters that could further dilute concentrations emanating from the source. Again, the managing agencies are committed to increasing water quality in this protected reach and should investigate whether further limitations on the project's diversion of clean water could increase the quality of water below.

5.3.3. Aquatic Habitat

Edison: *Average monthly flows downstream of Fairview Dam range from minimum instream flows in fall and winter . . . .* (PAD at p. 5-51.)

KRB: This statement is false. The "range" of flows falls well below "minimum instream flows." The minimum generation flow (the first 40-45 cfs incoming at Fairview Dam, which takes precedence over minimum instream flow requirements, see *supra* at § 3.7) has caused average daily flows to fall below the MIF for 513 days over the present license term. That number takes into account the fact that the MIF self-reduces to available incoming flows when such are below the MIF targets. That number will also substantially increase when USGS reports data for water year 2021. Furthermore, the average daily flow data provided by USGS does not inform us how often the MIF was left unsatisfied for a portion of the day — a figure that will be higher than 513 days. Managing agencies cannot capture the true impact of the project on the fishery below Fairview Dam without hourly flow data from both relevant gauges for the license period.

Edison: *SCE diverts 35 cfs year-round via the Project conveyance system and the KR3 Powerhouse tailrace to provide cooler water to CDFW's Kern River Planting Base Hatchery.* (PAD at p. 5-51.)

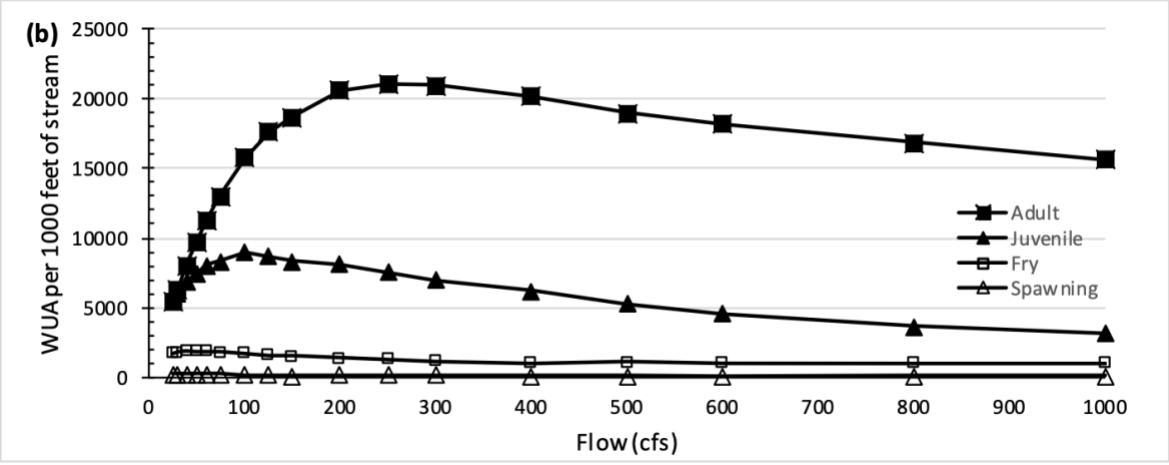
KRB: Earlier, SCE indicated it diverts 40 to 45 cfs for the "hatchery." (PAD at p. 4-16.) As we have established, that quantity of water is being diverted for minimum power generation. Hatchery operations have historically required 25 cfs or less, and Edison has

continued diverting 40 to 45 cfs even when the hatchery is closed, at great expense to the health of the natural fishery below Fairview Dam. (See *ante*, § 3.7.)

Edison: *The Fairview Dam Bypass Reach has two distinct river segments: Segment 1 extends from Fairview Dam (RM 18.6) downstream to Hospital Flat Campground (RM 10.0), where the river is constrained within a narrow, single channel with a 2 to 3 percent gradient; Segment 2 extends from Hospital Flat Campground to the KR3 Powerhouse (RM 3.1), where the river transitions to a wider, lower gradient (1 to 2 percent) segment with some split channels and normal bar development . . . .* (PAD at p. 5-52.)
KRB: The steeper, more channelized nature of segment 1, which includes the popular Fairview, Chamise Gorge, and Ant Canyon runs, offers enjoyable boating at flows lower than are required for enjoyable boating in segment 2.

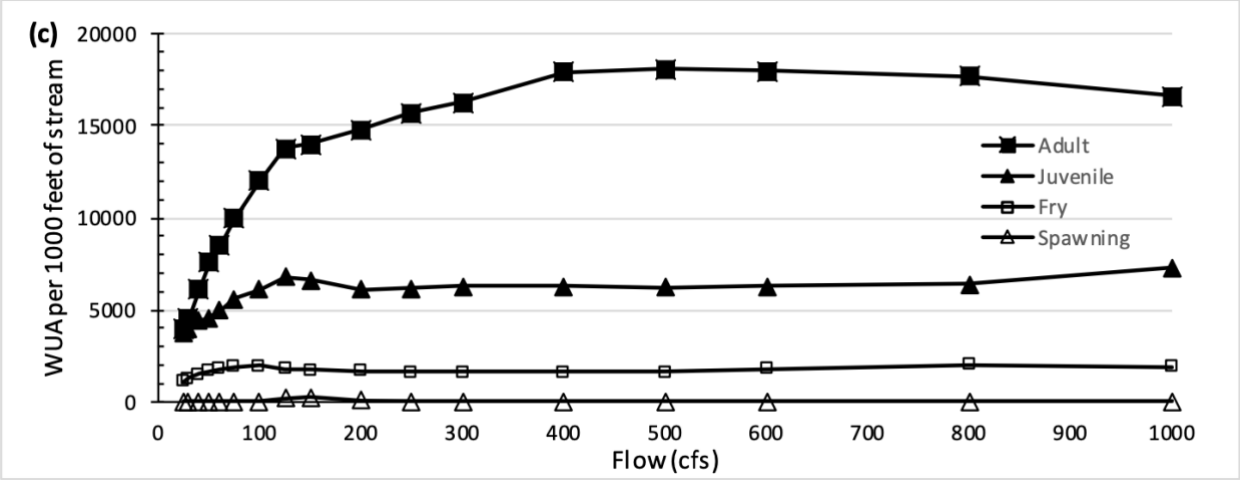
Edison: *An instream flow incremental methodology (IFIM) study was previously completed in the Fairview Dam Bypass Reach (SCE, 1991). Physical habitat simulations (PHABSIM) were completed using an IFG-4a model, and streamflow-dependent habitat indexes and weighted usable area (WUA) curves were developed for rainbow trout (Oncorhynchus mykiss) and brown trout (Salmo trutta) adult, juvenile, fry, and spawning life stages for flows ranging from 25 to 1,000 cfs using Bovee (1978) criteria curves and the HABITAT PHABSIM model.* (PAD at p. 5-54.)
KRB: The 1991 IFIM study showed that life prospects for adult rainbow trout in the fishery below Fairview Dam begin to decline when flows move towards 200 cfs from 250 (Segment 1) or 400 (Segment 2) cfs. Life prospects then *sharply plummet* as flows fall below 200 cfs:

Figure 26: NFKR Segment 1 (Upper Half) IFIM Habitat Evaluation, 1991[69]



[69] PAD at p. 5-55

Figure 27: NFKR Segment 2 (Lower Half) IFIM Habitat Evaluation, 1991[70]



These figures suggest that an MIF baseline of at least 200 cfs should be targeted for the health of the fishery. That suggestion is fully supported by contemporary environmental flow science.[71] Presently, the MIF calls for flows between 40 and 130 cfs, depending on the time of year, and those amounts are confounded in dry years by the MIF's position as second-in-line to the minimum generation flow.

CDFW's dated baseline metric characterizes the current NFKR MIF regime (which is 13% of mean annual discharge ["MAD"] in summer, and 5% in winter, per USGS data) as consistent with a "poor or minimum" fishery habitat in summer and "severe degradation" in winter:

[70] *Ibid*.

[71] Environmental Flow Analysis on the NF Kern, A Case Study: 1997-2020 Data Set, Elizabeth Duxbury (2022) ["Duxbury EFA"], also available: https://www.kernriverboaters.com/s/Environmental_Flows_NF_Kern-1997-2020.pdf

Figure 28: CDFW Minimum Instream Flow Program 1976 Baseline Metric[72]

Narrative Description of Flow	April to September	October to March
Flushing or maximum flow	200% from 48 to 72 hours	
Optimum range of flow	60-100%	60-100%
Outstanding habitat	60%	40%
Excellent habitat	50%	30%
Good habitat	40%	20%
Fair or degrading habitat	30%	10%
Poor or minimum habitat	10%	10%
Severe degradation	<10%	<10%

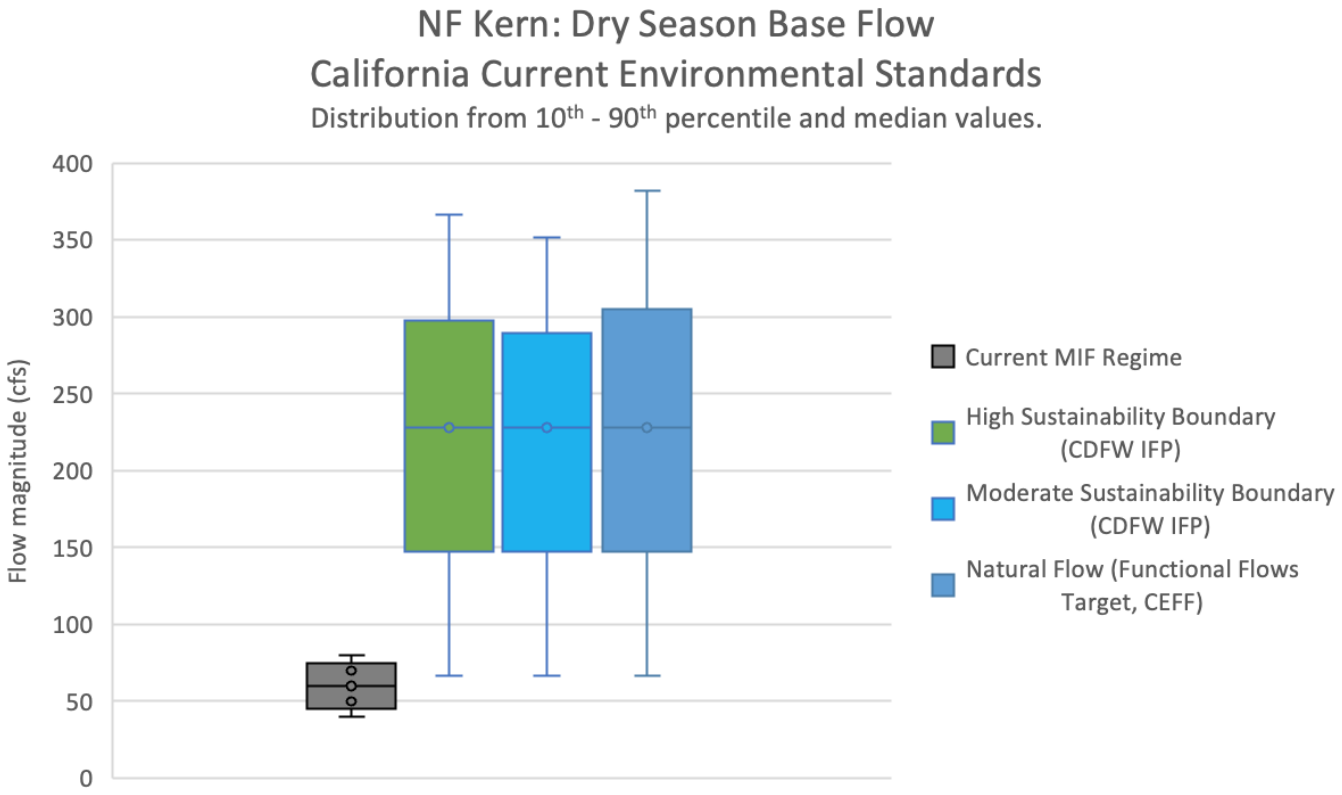
The situation is worse for the protected NFKR than suggested by this metric. The NFKR MIF is undermined during summer months by the primacy of the minimum generation flow: Edison claims the first 40-45 cfs at Fairview Dam for power generation, notwithstanding the MIF.[73] As a result, what is left for the fishery during the hottest days of summer regularly consists of *much less than 10%* of MAD — all the way down to 5% of MAD in 2021[74] — meaning the NFKR summer MIF regime, as implemented by the license subject to the minimum generation flow, regularly entails "severe degradation" of the fishery habitat, just like its winter regime.

The gulf between the current MIF and one supported by science widens under the scrutiny of more contemporary instream flow evaluations, such as the Environmental Agency, Sustainability Boundary, and Flow Duration Boundary techniques used throughout the EU, UK, Canada, and Australia — and recommended by CDFW.[75]

Applying these more modern approaches to the NFKR, one discovers that the current MIF falls far short of what is required for the health of this fishery:

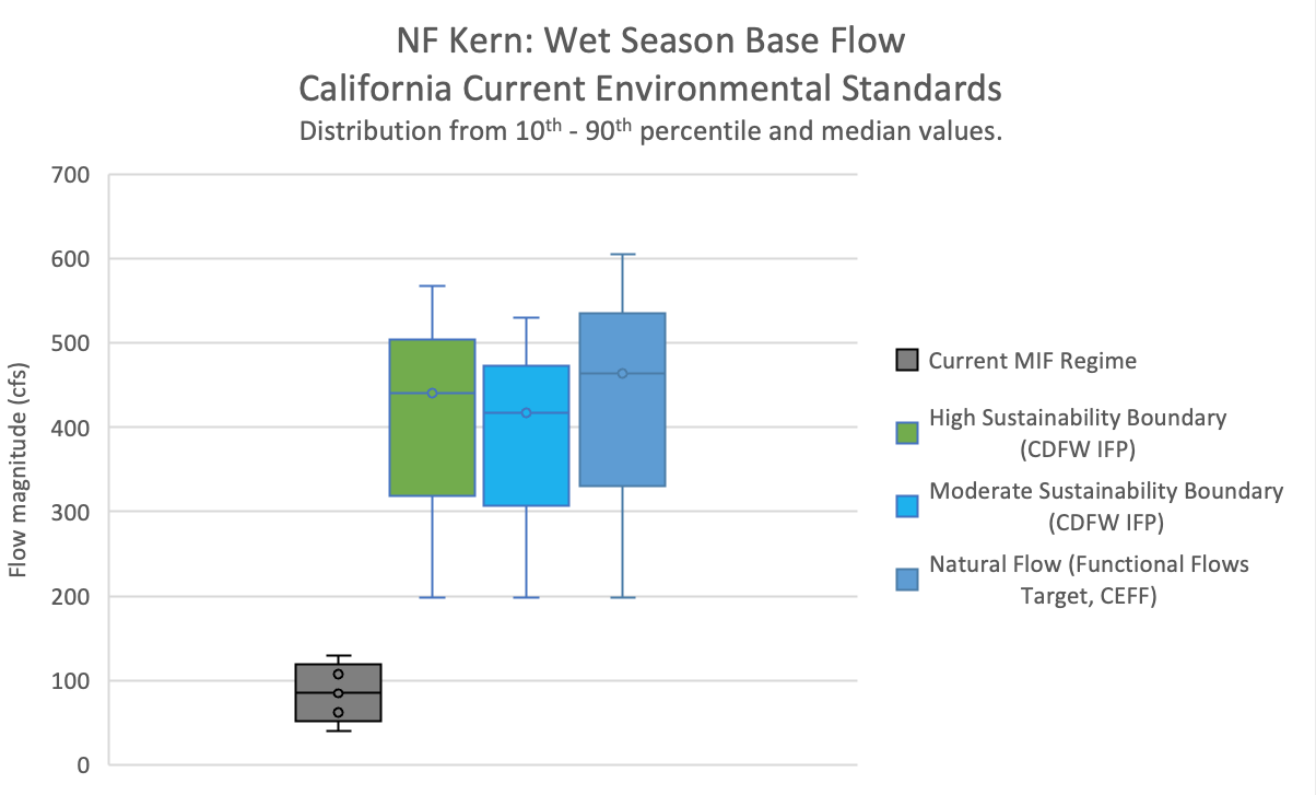
[72] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=93597&inline at p. 20
[73] PAD at p. 4-16; see also *supra*, at § 3.7. Major Water Uses
[74] Compare the numbers in Figure 2: Flows Below Fairview Dam, Summer 2021 (flows down to 39 cfs) with the NFKR mean annual flow (763 cfs) in Figure 17: Mean Inflow at Fairview Dam, 1997-2020
[75] Duxbury EFA

Figure 29: Contemporary Scientific MIF Evaluations, NFKR Dry Season[76]



[76] *Ibid.*

Figure 30: Contemporary Scientific MIF Evaluations, NFKR Wet Season[77]



CDFW is aware that many of this state's rivers are under-watered and unhealthy due to hydropower operations, and has sought to identify them in its new draft strategic management plan[78]:

Objective:

- By 2023, Fisheries Branch in conjunction with Regional staff will create a list of high-quality trout waters currently impaired from dam and diversion operations, or those that could benefit from revised flow regimes.

The evidence starting with CDFW's dated metric and including more contemporary methods of evaluation establishes that the protected NFKR is one of those under-watered rivers deserving of a more robust MIF. Should Edison be granted a new 40-year license to operate KR3 (the current default term), these under-watered, unhealthy conditions will not terminate until the year 2066. The managing agencies should require the range of studies pursuant to contemporary science necessary to establish a healthy fishery below Fairview Dam. CDFW's Instream Flow Program[79] and the California Environmental Flows Framework[80] would be good starting points.

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[77] *Ibid.*
[78] CDFW Draft SMP at p. 23.
[79] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow
[80] https://rivers.codefornature.org/#/home

Edison: *SCE agreed to implement new instream flows below Fairview Dam and to establish a funding account to benefit fishery resources of the Upper Kern Basin (SCE et al., 1995, amended 2005). In 2005, an agreement was established which provides for the creation of the Kern County Community Foundation (Foundation) to manage the funding account. (*PAD at p. 5-59.)

KRB: One commonly held view[81] among anglers is that the local hatchery and trust fund have not been paying off, and that the Kern River Rainbow is as at-risk as ever despite 15 years of trust fund availability. That viewpoint questions what good was accomplished by a settlement that left the fishery below Fairview Dam unhealthy and unenjoyable due to an unreasonably low MIF and the precedence of the minimum generation diversion over the MIF.

Edison: *The estimated density and biomass of both naturally produced and hatchery-raised rainbow trout declined abruptly at all monitoring sites in 2016 compared to previous survey years (Table 5.3-3 through Table 5.3-5).* (PAD at p. 5-62.)

KRB: Some sites declined more abruptly than others. The monitoring studies showed a percentage decline in trout population between 2011 and 2016 of 49% for the sites with unimpaired flows above Fairview Dam. The sites with impaired flows below Fairview Dam, by contrast, showed a 95% decline:

[81] https://www.bakersfield.com/opinion/community-voices-time-to-get-the-kern-river-rainbow-trout-back/article_6f972028-8b65-11eb-b441-037a78983356.html

Figure 31: Fish Monitoring Results, 1998-2016[82]

Table 5.3-3. Estimates of Fish Abundance at Five Direct Observation Sites on the North Fork Kern River During the Current License Period (1998, 2006, 2011, 2016)

Abundance (fish/kilometer)					
Site/Species	**1998**	**2006**	**2011**	**2016**	**Mean**
Above Johnsondale Bridge (RM 26.1)					
Rainbow trout	420	233	215	47	229
Sacramento pikeminnow	N/A	N/A	0	0	0
Sacramento sucker	240	234	254	281	252
Total for Site	**660**	**467**	**469**	**328**	**481**
Above Fairview Dam (RM 23.3)					
Rainbow trout	140	140	48	38	92
Sacramento pikeminnow	N/A	N/A	0	1,243	622
Sacramento sucker	320	60	1,401	334	529
Total for Site	**460**	**200**	**1,449**	**1,615**	**931**
Roads End (RM 19.8)					
Rainbow trout	33	76	486	0	149
Sacramento pikeminnow	N/A	N/A	0	662	331
Sacramento sucker	67	173	1,397	265	476
Total for Site	**100**	**249**	**1,883**	**927**	**790**
Goldledge (RM 14.2)					
Rainbow trout	340	220	324	17	225
Sacramento pikeminnow	N/A[a]	N/A[a]	162	34	98
Sacramento sucker	1,480	1,260	1,515	0	1,064
Total for Site	**1,820**	**1,480**	**1,839**	**51**	**1298**
Hospital Flat (RM 10.0)					
Rainbow trout	556	33	310	30	232
Sacramento pikeminnow	N/A	N/A	526	122	324
Sacramento sucker	1,900	967	898	0	941
Total for Site	**1,456**	**1,000**	**1,208**	**152**	**954**

Source: SCE, 2012a, 2017

N/A = data not available; RM = River Mile

2011-2016 trout decline:

78%

21%

Above Fairview

Below Fairview

100%

95%

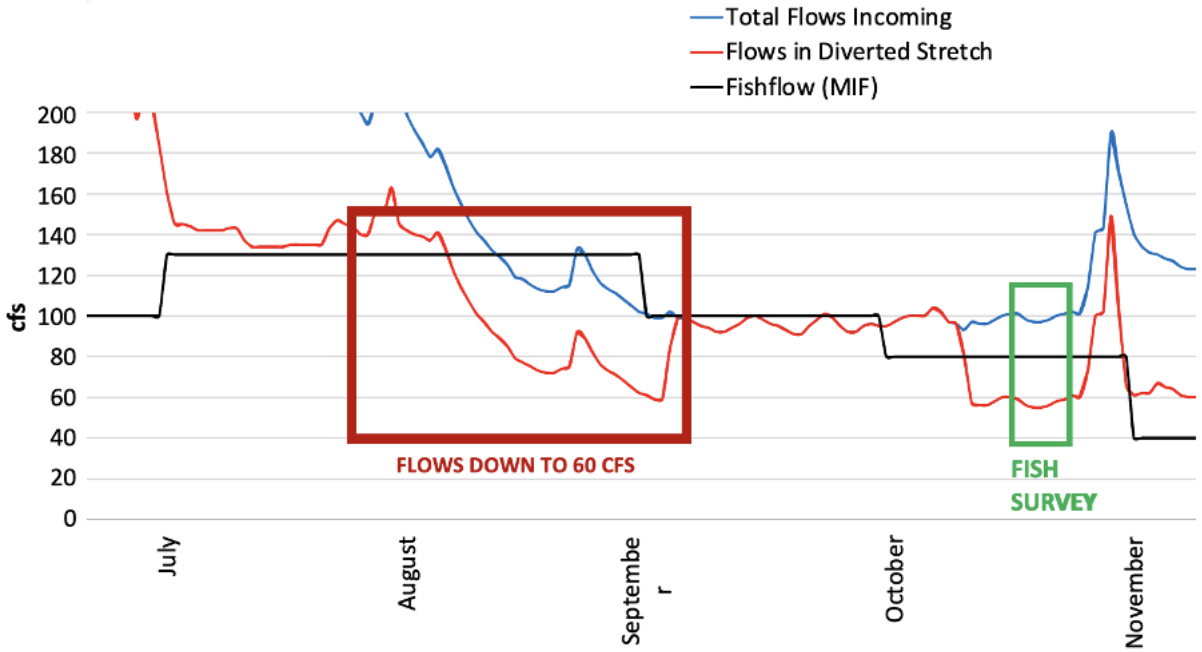
90%

Total Percentage Decline
Above Fairview: 49%
Below Fairview: 95%
Predominate Variable Between Above & Below = KR3 Hydroproject

[82] PAD at p. 5-63 (KRB markup)

The most likely cause of the difference in population decline above and below Fairview Dam is the operation of the dam itself under the current KR3 license. The following chart compares flows above and below Fairview Dam for 2016, the year in which the trout population decreased by about half above the dam but by about 95% below it. Note how the minimum generation flow sets the water level more than 40 cfs below the MIF in August and early September — the hottest times of the year. Edison briefly gave up its minimum generation flow for five weeks prior to the study (September 04 through October 12), but even that couldn't fix the damage that had been done:

Figure 32: NFKR Flows Above & Below Fairview Dam, Summer 2016



As USFS, NPS, and CDFW have previously concluded, "The water diversion that has the greatest impact on the trout fishery occurs in Segment 1. Water is diverted by Southern California Edison Company at Fairview Dam for hydro-electric power generation at Kern River Number 3 Powerhouse. There is potential for improving habitat for trout during low flow periods by reducing water temperatures by increasing flow releases from Fairview Dam."[83]

Since the time that was written, an MIF regime that fails to meet CDFW's own dated metric for a healthy fishery was imposed on the NFKR, and that MIF is itself second-in-line behind a minimum generation flow of 40-45 cfs. This is not a formula for a healthy fishery.

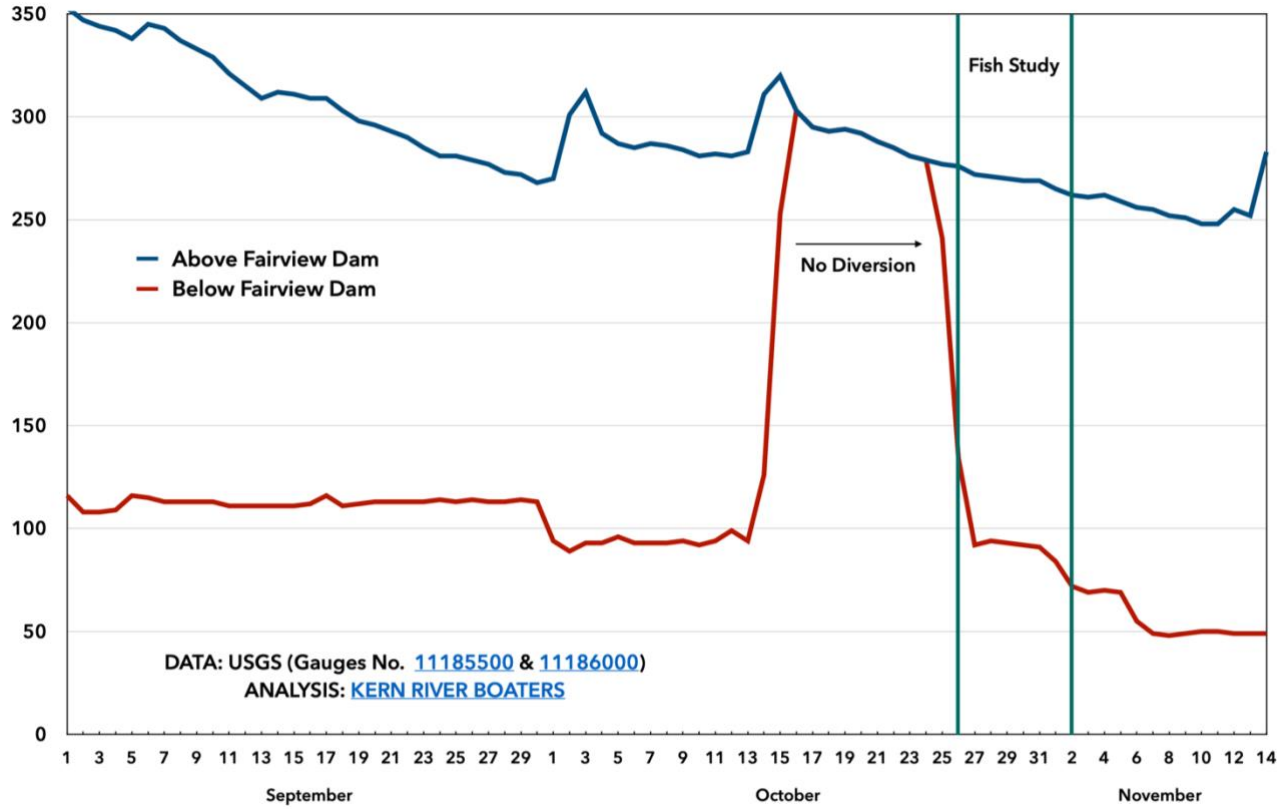
This fishery should be subjected to a "sensitive period indicator flow" analysis called for by CDFW: "When stream flow drops below the sensitive period indicator, fish and benthic macroinvertebrates may be particularly sensitive to additional water reductions and other stressors (*e.g.*, poor water quality)." In dry year summers, the minimum generation

[83] 1995 USFS UKBF Plan at p. V-3

flow amounts to an "additional water reduction" that may be especially harmful to this fishery by taking precedence during the hottest days — when the fishery most needs the water that is available.

Finally, in studying these issues, it became apparent that Edison has given up its minimum generation flow for some period of time prior to the fish monitoring studies. That can only act to confound the studies, as normal operations would have Edison taking 40-45 cfs as a first-in-line diversion ahead of the MIF. For instance, the 2006 monitoring study was conducted October 25 through November 02.[84] Here are the daily average flows above and below Fairview Dam before, during, and shortly after that study:

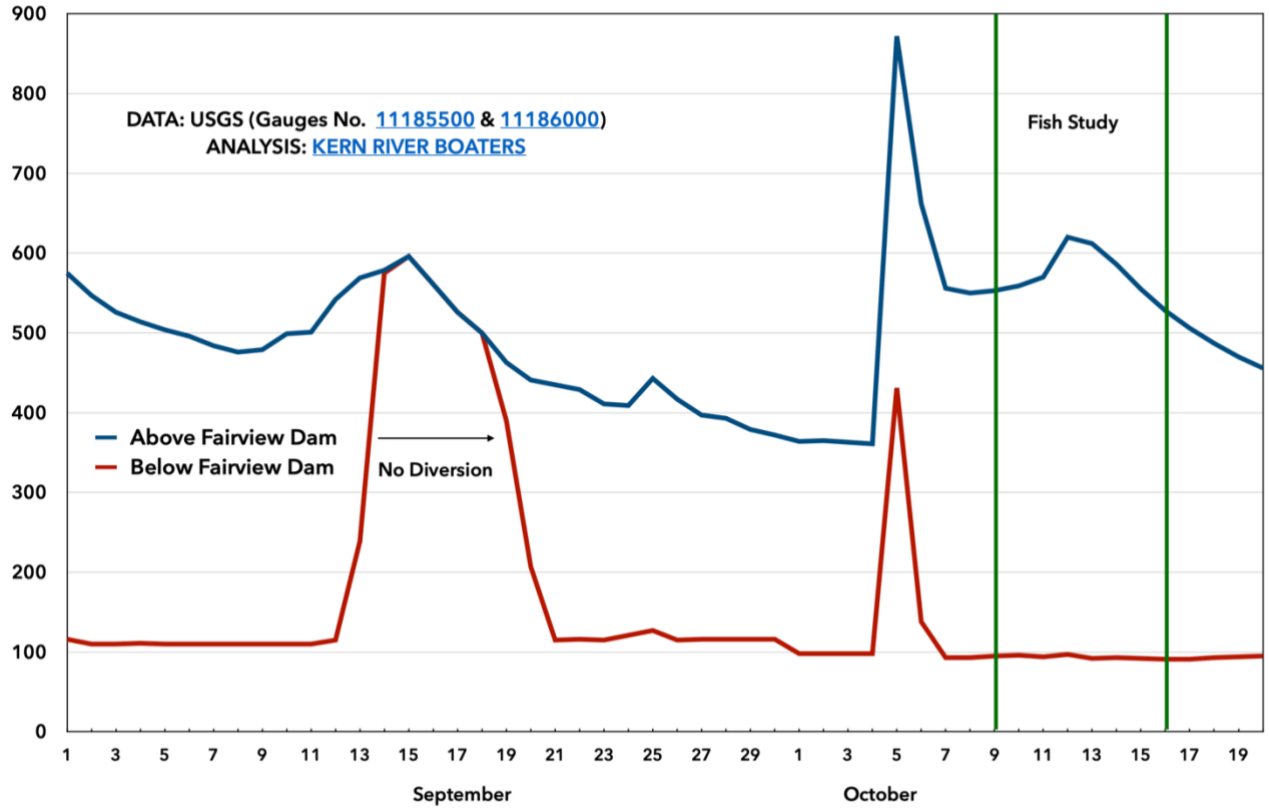
Figure 33: Average Daily Flows Surrounding 2006 Fish Study



The 2011 study was conducted October 9 through October 16.[85] Here are the daily average flows above and below Fairview Dam before, during, and shortly after that study:

[84] KR3 FISH STUDY (2007) at p. 7
[85] KR3 FISH STUDY (2012) at p. 7

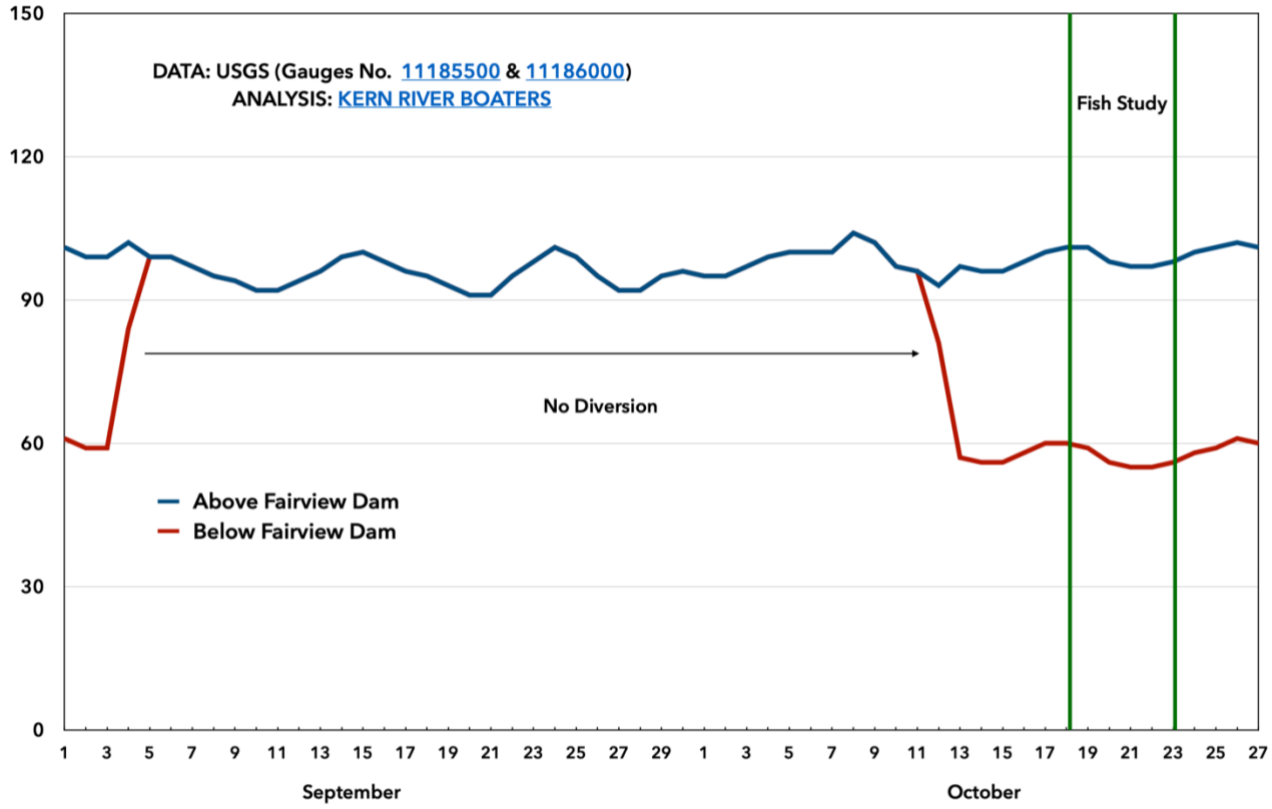
Figure 34: Average Daily Flows Surrounding 2011 Fish Study



The 2016 study was conducted October 18 through October 23.[86] Here are the daily average flows above and below Fairview Dam before, during, and shortly after that study:

[86] KR3 FISH STUDY (2017) at pp. 2-3

Figure 35: Average Daily Flows Surrounding 2016 Fish Study



KRB notes that Edison postponed the mandated 2021 fishing survey, which likely would have revealed trout devastation similar to that discovered in 2016. (See *supra*, *Figure 31: Fish Monitoring Results, 1998-2016*.) That postponement plus the belated temporary termination of the minimum generation flow[87] means the fish monitoring study will take place under far better conditions than those condoned by the current license in 2021 and other dry years.

Edison: *Between 2001 and 2020, an average of 28,600 nonnative rainbow trout were planted in the NFKR annually between Fairview Dam and the KR3 Powerhouse, and 12,500 were planted annually just upstream of Fairview Dam.* (PAD at p. 5-67.)
KRB: With the CDFW hatchery's two recent, extended closures (it has been closed four years out of the last six, and counting[88]), most planting has been accomplished by the state's more centralized and efficient hatchery facilities. Given the problems at the local

[87] See *post*, fn. 89
[88] https://www.bakersfield.com/news/hatchery-closes-down-again-following-three-years-of-renovations/article_c24d71b4-2dd7-11eb-a774-276cf8699ec7.html

hatchery, the lack of an identifiable funding source for repairs, and the availability of larger, more efficient hatcheries in this state, there is a good chance it will never reopen.[89]

5.3.7.1. Special-status Amphibian and Aquatic Reptiles

Edison: *Foothill Yellow-Legged Frog* (PAD at p. 5-82.)

KRB: The yellow-legged frog was once abundantly present in the Sierra Nevadas.[90] Currently, the yellow-legged frog has experienced significant population decline in most known historical locations and is nearing extinction in parts of its range. "Water development and diversions are likely to be the primary cause of population declines and are currently a prominent risk factor because they result in hydrological changes that chronically affect several aspects of the species' life history."[91] Over the last 100 years of water diversion within the Kern drainage, the number of yellow-legged frogs present has plummeted in the affected project environment. They do still exist nearby and just a few miles upriver[92], but the current minimum instream flow regime and other project impacts have removed them from their historic habitat. Notably, one of the requirements of the yellow-legged frog is a flow regime that can "Mimic natural hydrograph to degree possible [and] restore some components of spring snow-melt hydrograph."[93] To the extent this or any other protected species has had a notable, at-risk decline of its historical presence near

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[89] On June 04, 2021, KRB asked CDFW to exercise its authority under the license to terminate the first-in-priority 35 cfs diversion at Fairview Dam because the hatchery was closed and the health of the fishery was (again) at risk: summer flows would not be able to satisfy both the 35 cfs diversion and the MIF, and the diversion has priority. On July 08, CDFW indicated it would not, citing a wide variety of reasons, none having to do with the health of the fishery. Flows in the fishery that summer, as KRB predicted, fell woefully low — as low as 39 cfs in early September — as Edison continued diverting the first 42-43 cfs at the dam with the hatchery closed. (See *supra*,

Figure **3**.) In January 2022, CDFW finally exercised its authority to terminate the 35 cfs diversion — too late prevent the damage done in 2021. See FERC eLibrary No. 20220110-5025

[90] See Center for Biological Diversity. (2021) Mountain and Sierra Nevada yellow-legged frogs: https://www.biologicaldiversity.org/species/amphibians/Sierra_Nevada_mountain_yellow-legged_frog

[91] Hayes, MP, CA Wheeler, AJ Lind, GA Green, DC Macfarlane. (2016) Foothill yellow-legged frog conservation assessment in California. Gen. Tech. Rep. PSW-GTR-248. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 193 p.

[92] PAD at p. 5-80

[93] See *supra*, fn. 83 (Hayes)

the bypassed reach of the NFKR or its encumbered tributaries, project operations must be considered a prime causative suspect.

Edison: *Western Pond Turtle* (PAD at p. 5-82.)
KRB: If excess pressure within the conveyance flowline needs to be reduced, the project siphon is equipped to release water from the flowline into Cannel Creek. (PAD at p. 3-5.) This contingency would appear to significantly disrupt the baseline habitat where these turtles are likely to reside. The managing agencies should study the risk the siphon depressurizing process poses to these turtles and impose conditions to remove it.

5.5.4. Special Status Wildlife

Edison: *Table 5.5-1. Special-Status Wildlife Species Occurrence Special Status Species Potential*

Scientific/ Common Name	Federal Status	State Status	Habitat Associations	Likelihood for Occurrence in Project Vicinity
Aplodontia rufa californica Sierra Nevada mountain beaver	–	CDFW _SSC	Found in areas with dense growth of small deciduous trees and shrubs, wet soil, and abundance of forbs in the Sierra Nevada and east slope. Needs dense understory for food and cover. Burrows into soft soil. Needs abundant supply of water.	May occur. Moderate potential due to marginally suitable habitat in Project Vicinity. However, suitable wet forest habitat occurs along stream adjacent to the Project Vicinity. There are documented occurrences along the Kern River.

(PAD at p. 5-116.)
KRB: Edison's phrase "may occur" is undermined by its own notation that "there are documented occurrences along the Kern River." (PAD at p. 5-116.)

5.7.3. Recreation at the Project

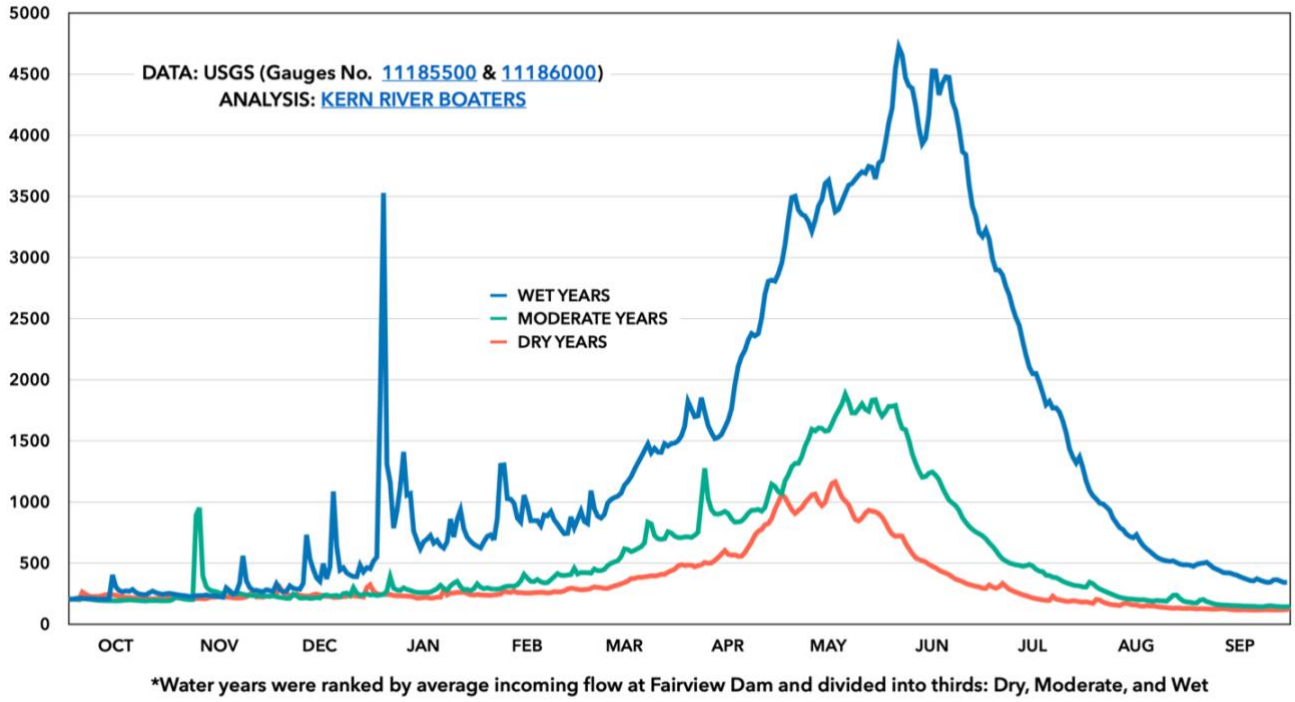
Edison: *SCE does own an informal whitewater put in and take out—KR3 Powerhouse Put-in/Take-out—approximately 250 yards downstream of the KR3 Powerhouse. . . . [C]ommercial operators are required to obtain a permit from SCE for use of the site to minimize congestion and retain its informal status.* (PAD at p. 5-135.)
KRB: Local commercial outfitter Sierra South has acknowledged it cannot take any public stance against Edison because it is dependent upon this access point to monetize its whitewater outfitting operations on the "Lickety Split" section of the NFKR, which accounts for a large portion of its business revenue. That is why Sierra South did not publicly support the decommissioning of the Borel hydroproject (P-382), though decommissioning was squarely in the interests of the whitewater community. Edison's ability to deny outfitter access to the lucrative Lickety run eliminates the ability of outfitters dependent on that revenue stream to speak freely in the public interest.

5.7.4.1. Whitewater Boating

Edison: *The NFKR is an important recreation resource that provides seasonal whitewater boating opportunities.* (PAD at p. 5-138.)

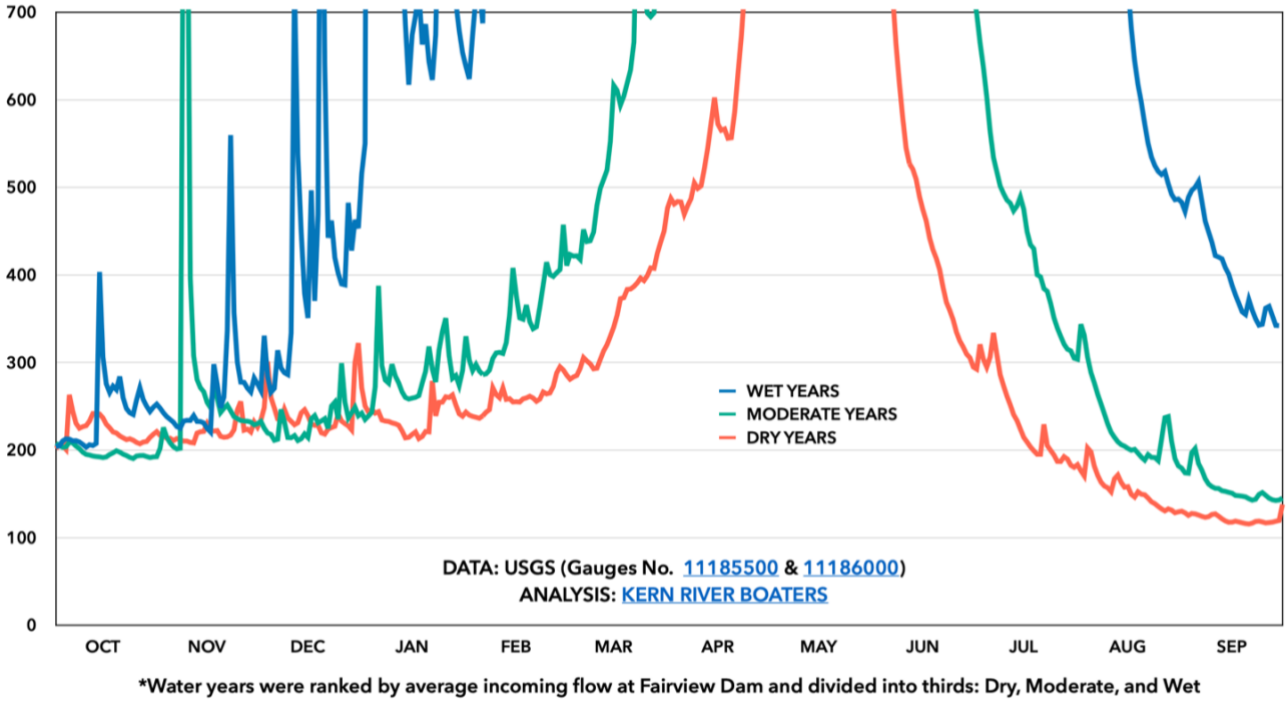
KRB: But for the KR3 hydroproject, the unimpaired NFKR would provide enjoyable whitewater boating opportunities year-round in wet years, near-year-round in moderate years, and for three seasons in dry years:

Figure 36: NFKR Mean Unimpaired Flows (cfs) by Water Year Type, 1997-2020



A magnified look at the same data shows that unimpaired average daily flows (recall that peak daily flow data is not available from USGS) remain above 200 cfs in wet years, dip below that value briefly in moderate years, and dip below it for a few months in dry years:

Figure 37: NFKR Mean Unimpaired Flows (cfs) by Water Year Type, 1997-2020

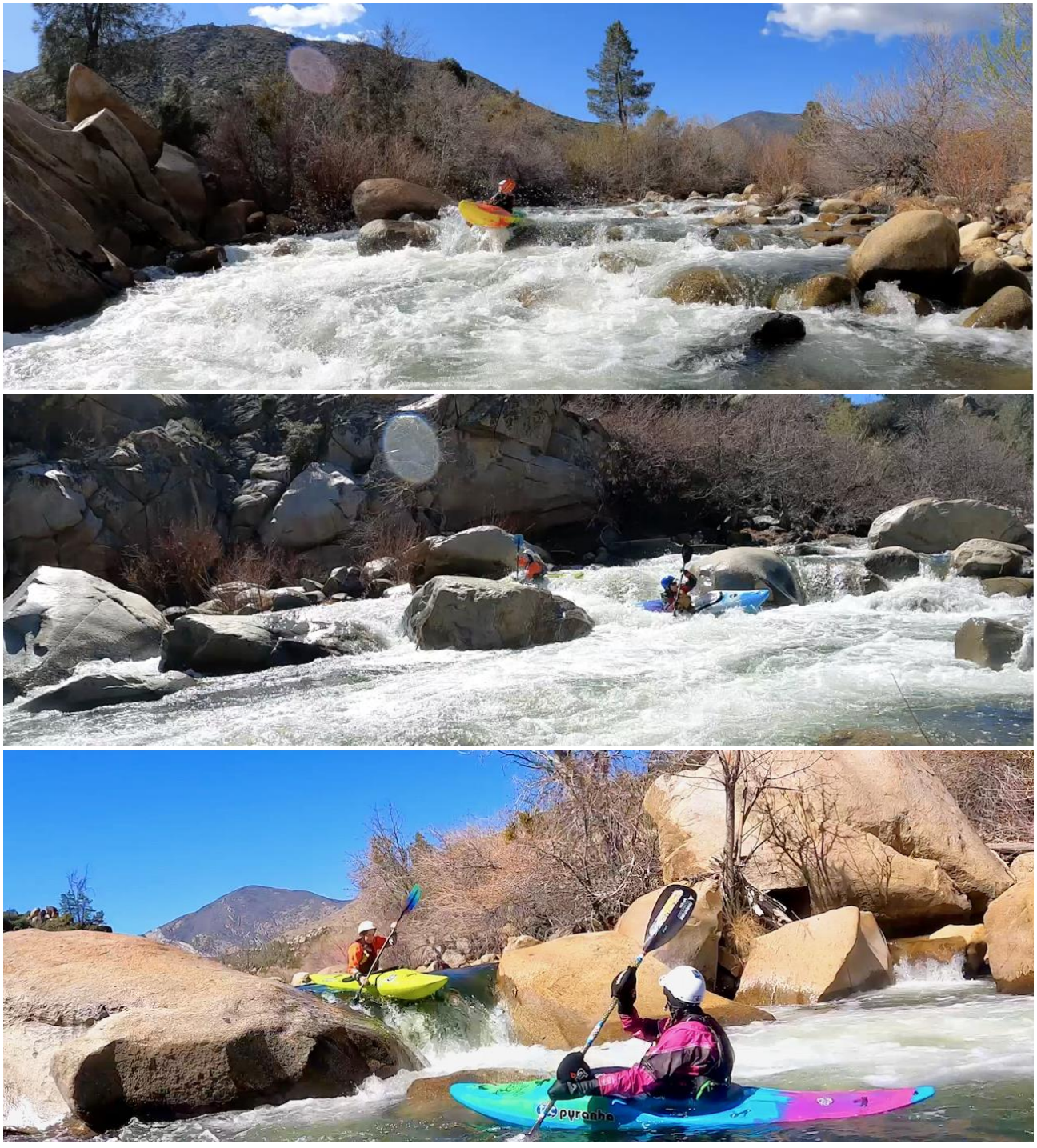


The NFKR provides enjoyable whitewater recreation when average daily flows approach 200 cfs. Just a few months ago, in mid-September 2021, Edison took KR3 offline for about six weeks, leaving the unimpaired natural flow in the riverbed below Fairview Dam. During the first five weeks, flows were in the low 100s; 2021 was, after all, the second driest water year in the greater Kern watershed since 1961, according to NOAA.[94] An October storm came through and raised flows up to about 230 cfs, quickly settling down to about 170 cfs over the next week. Local boaters, Sierra South guides, and boaters from Southern California took advantage of this rare opportunity to paddle the NFKR at natural flow levels in the fall.

KR3 was briefly offline in March 2021 when natural flows hovered around 225 cfs, and boaters — including Sierra South guides and clients — took to the water like they do, as documented in this social media post and video.[95]

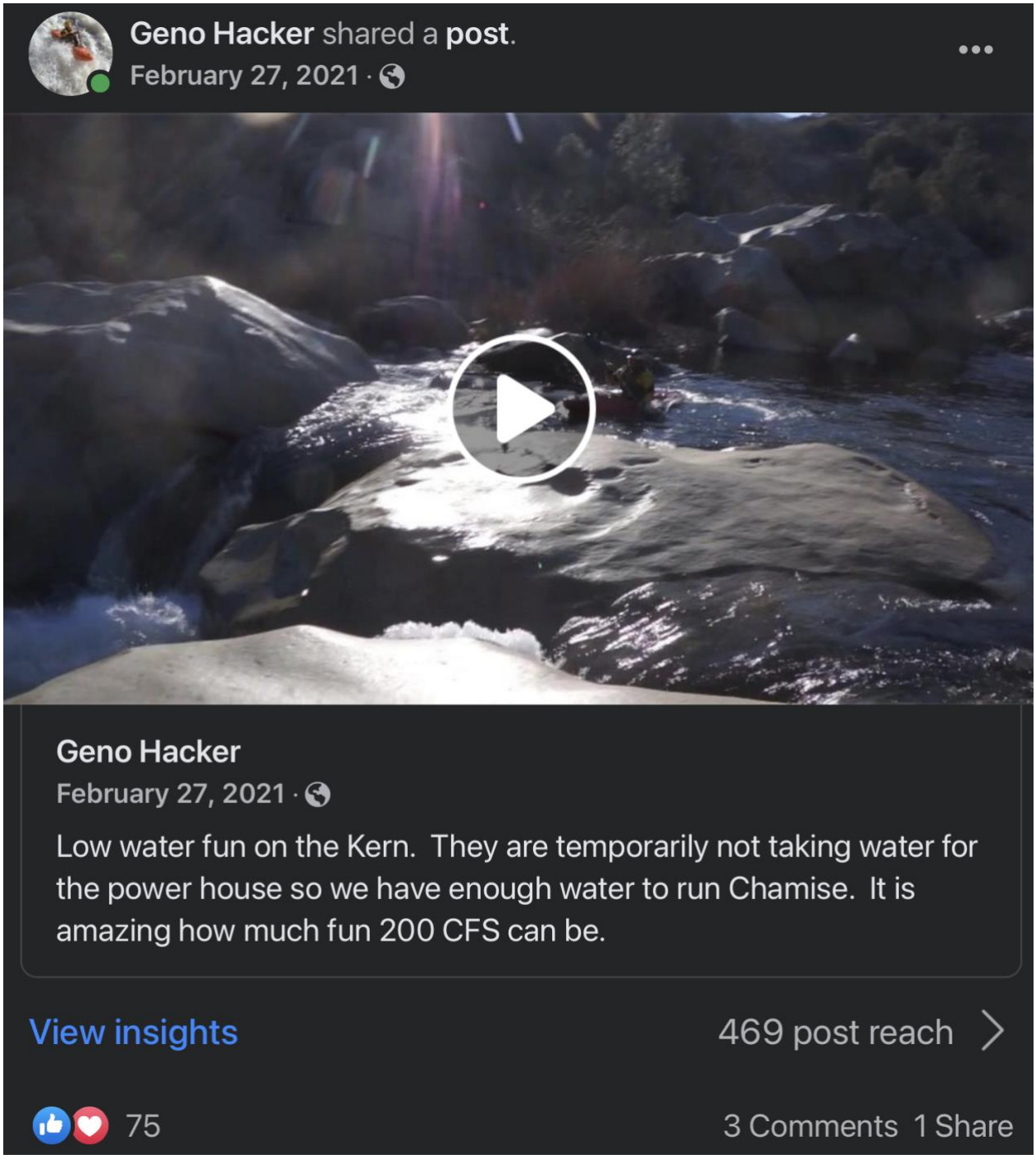
[94] https://www.cnrfc.noaa.gov/ensembleProduct.php?id=ISAC1&prodID=12
[95] https://www.facebook.com/kernville/posts/10222298608832299

Figure 38: March 2021 on NFKR, 220 CFS




pyranha

Here is yet another boater from early 2021 on social media: “It is amazing how much fun 200 CFS can be.”[96]



The FERC record supports a finding that the natural conditions of the NFKR provide opportunities for enjoyable whitewater recreation whenever flows approach 200 cfs and

[96] https://www.facebook.com/groups/kernriverboaters/permalink/2905553486390382/

above. In 1994, American Whitewater concluded that "whitewater recreation is enhanced on the Kern at flows above 200 to 250 cfs" — and advocated that all flows from "200 to 1,400 cfs" should be left in the river to "enhance" recreation in the dewatered reach:

Figure 39: 1994 Comments of American Whitewater[97]

19941011-0107(3181).PDF

Table II-7, Whitewater Flow Suitability, attempts to determine this lower end of recreational flows. However, the conclusions drawn from this data are invalid because many of these figures were determined through video review only, and contradicted the surveyed results of the participants.

What the boating representatives have learned from this study is that whitewater recreation is enhanced on the Kern at all flows above 200 to 250 cfs, and that private boaters can (and do) scrape down at even less. Rafting is possible between 550 and 700 cfs, and flows reach optimal (boaters' determination of optimal) for recreation on the upper half at 1050 cfs, and in the lower half at 1400 cfs (see Appendix B).

In order to maximize future whitewater recreation on the Kern we suggest that the current flow management scenario, in which SCE takes the first 600 cfs after minimum fishery flows, be reversed.

-Below 200 cfs there appears to be little opportunity for paddling on any section. SCE could use all natural flow (except for minimum instream flow for fish and aesthetics) below this for power production.

-Above 200 cfs SCE could not divert any water until the natural flow exceeded 1,400 cfs (optimum for raft passage and most suitable to create repeat commercial customers).

AW reiterated its conclusion in 1995, adding that lower flow releases "would significantly improve weekday recreation, early season recreation, and late summer recreation":

[97] FERC eLibrary No. 19941011-0107 at p. 5

Figure 40: 1995 Comments of American Whitewater[98]

Document Accession #: 19950516-0150 Filed Date: 05/12/1995

11

the DEA recommends flows of 700 to only 1100 cfs at all times. These figures are incorrect, and an EIS will need to examine how addressing a broader flow scenario could improve or change the determinations of this DEA.

Lower flow releases (down to 250 cfs.) and a wider range of flows would significantly improve weekday recreation, early season recreation, and late summer recreation. They would also significantly improve the overall dollar value of whitewater recreation on the Kern. Unfortunately, rather than

AW's conclusions were seconded by local outfitter Chuck Richards, who headed the "Kern River Outfitters" alliance at that time, and added that persons in kayaks could "have fun" on the dewatered reach at only 200-250 cfs:

Figure 41: 1994 Comments of Chuck Richards (Kern River Outfitters)[99]

Chuck Richards' Whitewater, Inc.

Box W.W. Whitewater, Lake Isabella, CA 93240
(619) 379-4685
(619) 379-4444

June 30, 1994

Steve Nachtman
Stone & Webster
7677 E. Berry
Englewood CO 80111

Regarding: Kern River #3

Steve. . .

Here's a summation of my results with the Edison water flow testing in the bypassed 15 miles.

Kayaks, canoes, etc. can have fun at 200-250 cfs (& scrape down even lower).
Rafts can have fun at 700 cfs and scrape down possibly at 550.
Rafts reach optimum (in the upper half) by 1050 cfs
Rafts reach optimum in the lower half by 1400 cfs

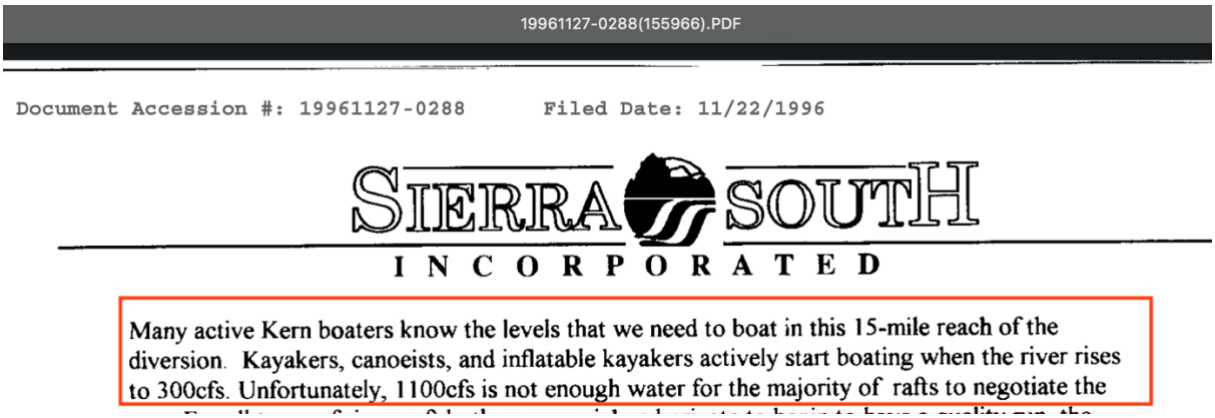
We were lucky [illegible]

Katharine Haines (now Edmundson) of the Kern River Valley Council asked the managing agencies to "respect the public interest by making the highest use of the river by reserving the first 1,400 cfs for public use."[100] Even Sierra South owner Tom Moore — who opined at

[98] FERC eLibrary No. 19950516-0150 at p. 11
[99] FERC eLibrary No. 19941011-0107 at "Appendix B"
[100] FERC eLibrary No. 19950518-0066 at p. 7

the February 10, 2021 TWG meeting that 550-700 cfs was required for enjoyable hardshell kayaking on the NFKR — argued back then that "[w]hen the river rises to 300 cfs, it should be retained in the riverbed . . . ." Why? "Many active Kern Boaters *know* the levels that we need to boat in this 15-mile reach of the diversion, [and they] actively start boating when the river rises to 300 cfs."

Figure 42: Comments of Tom Moore (Sierra South)[101]


19961127-0288(155966).PDF

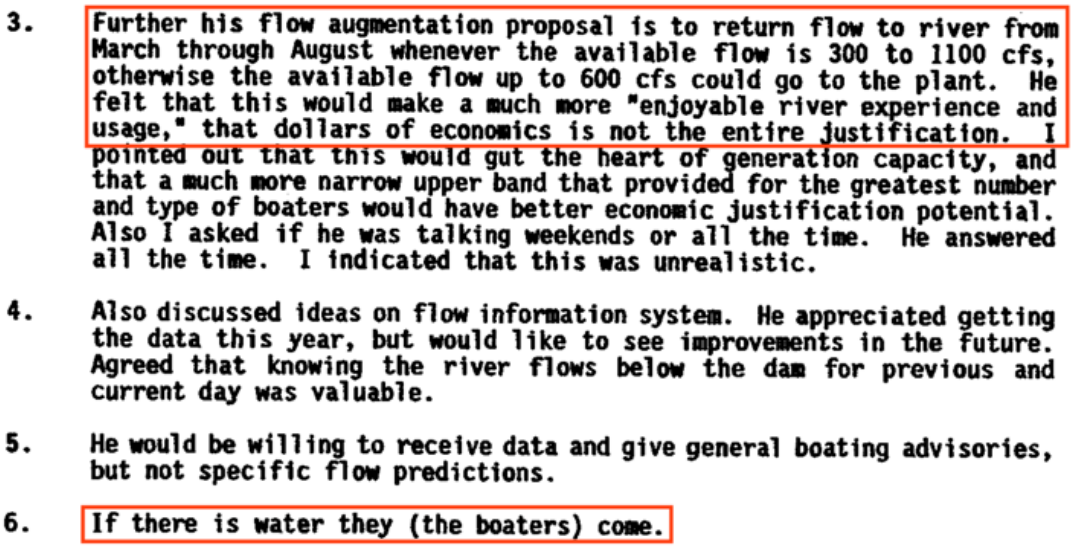
Document Accession #: 19961127-0288 Filed Date: 11/22/1996

SIERRA SOUTH
INCORPORATED

Many active Kern boaters know the levels that we need to boat in this 15-mile reach of the diversion. Kayakers, canoeists, and inflatable kayakers actively start boating when the river rises to 300cfs. Unfortunately, 1100cfs is not enough water for the majority of rafts to negotiate the

Moore also argued to "return flow to the river from March through August whenever the available flow is 300 to 1,100 cfs." Moore observed that flows starting at 300 cfs (and continuing to 1,100) would "make a much more enjoyable river experience and usage."

Figure 43: Comments of Tom Moore (Sierra South)[102]


3. Further his flow augmentation proposal is to return flow to river from March through August whenever the available flow is 300 to 1100 cfs, otherwise the available flow up to 600 cfs could go to the plant. He felt that this would make a much more "enjoyable river experience and usage," that dollars of economics is not the entire justification. I pointed out that this would gut the heart of generation capacity, and that a much more narrow upper band that provided for the greatest number and type of boaters would have better economic justification potential. Also I asked if he was talking weekends or all the time. He answered all the time. I indicated that this was unrealistic.

4. Also discussed ideas on flow information system. He appreciated getting the data this year, but would like to see improvements in the future. Agreed that knowing the river flows below the dam for previous and current day was valuable.

5. He would be willing to receive data and give general boating advisories, but not specific flow predictions.

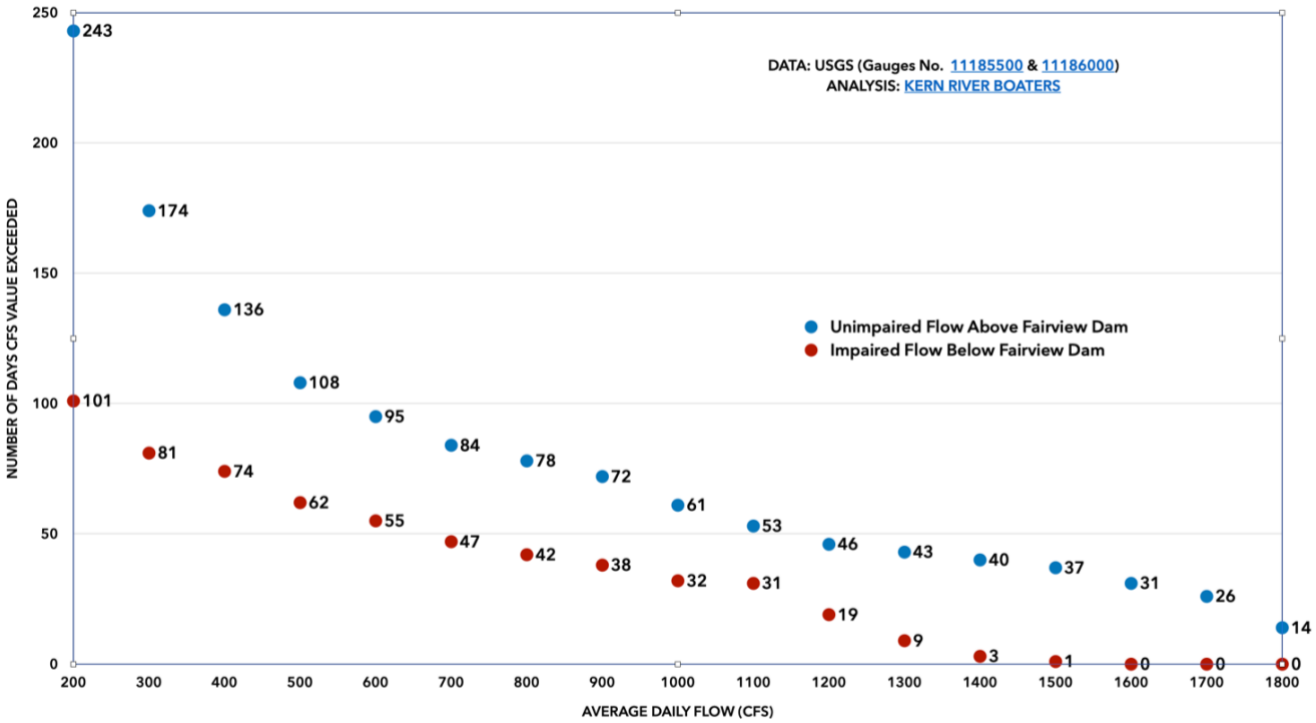
6. If there is water they (the boaters) come.

"If there is water, they (the boaters) come," concluded Moore.

Median annual flows for the term of the present license (1997-2020) show that 243 days have an average daily flow above Fairview Dam of 200 cfs or more. That figure drops to only 101 days below the dam due to project operations:

[101] FERC eLibrary No. 19961127-0288 at p. 2
[102] FERC eLibrary No. 19940802-0010 at p. 127

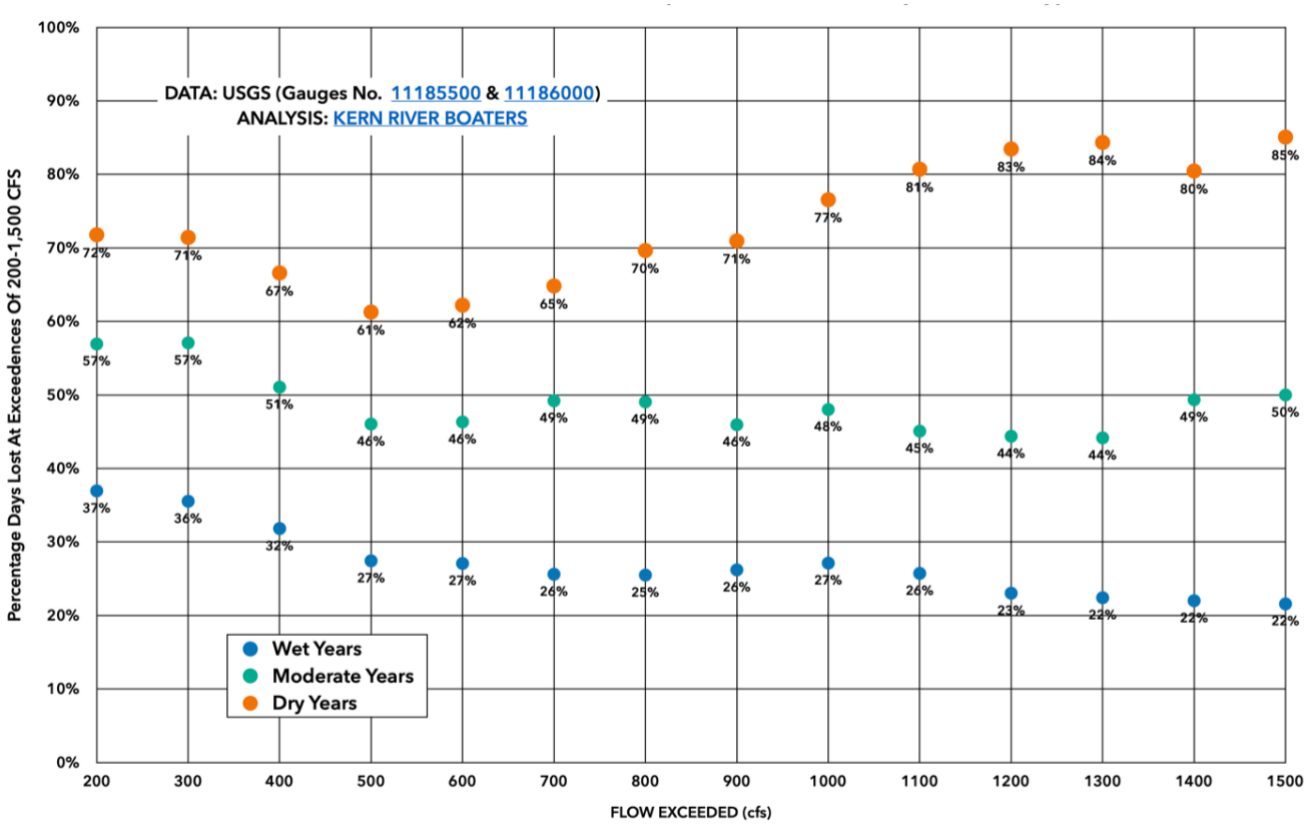
Figure 44: Median NF Kern Annual Exceedances, 1997-2020



Recall again that these figures are confounded because Edison has not provided peak daily flow information for the POR, because the project was offline for 1,455 of the 8,766 days in this record, and because it was partially offline for at least hundreds more. Even so, these figures show a vast inventory of days at all water levels upon which the NFKR would naturally offer whitewater boating opportunities that are denied to the public due to the operation of the project.

Finally, it is important to note that the project takes its biggest chunk out of recreational opportunities on the NFKR in low water years. The following chart compares the percentage of exceedances in the dewatered reach lost to project operations in high, moderate, and low water years over the POR:

Figure 45: Percentage of NFKR Exceedances Lost to KR3 Operations, 1997-2020, by Water Year Type (Thirds)



According to the USFS Wild and Scenic management plan for this river, "It is the objective of the Forest Service to provide river and similar water recreation opportunities to meet the public needs in ways that are appropriate to the National Forest recreation role . . . . Protect the free-flowing condition of designated wild and scenic rivers and preserve and enhance the values for which they were established."[103] The NFKR has outstanding recreational values, as evinced by the inventory of boating days it would provide at various flows if left unimpaired. The operation of the project denies the public these opportunities in three distinct ways: (1) it decimates opportunities for enjoyable low flow boating; (2) it halves opportunities for shoulder season low optimal boating; and (3) it caps the experience of peak flow boating at 600 cfs below naturally occurring flows. These lost opportunities should be restored by providing for natural flows below Fairview Dam at predictable times when the social demand for power generation is relatively low.[104]

[103] USFS CMP WSKR (nd) at p. 3

[104] See *ante*, Figure 10: CAISO "Super Off Peak" Periods, Weekdays & Figure 11: CAISO "Super Off Peak" Periods, Weekends

Edison: *During the previous Project relicensing, a whitewater flow suitability study was conducted in 1994 to determine the relationship between flows and the quality of whitewater boating in the Fairview Dam Bypass Reach (SCE, 1994)*. (PAD at p. 5-139.)
KRB: Whitewater boating may not have been in its infancy in 1994, but it was still in its formative years. As the sport has matured, three elements have conspired to increase public interest in boating at lower flows.

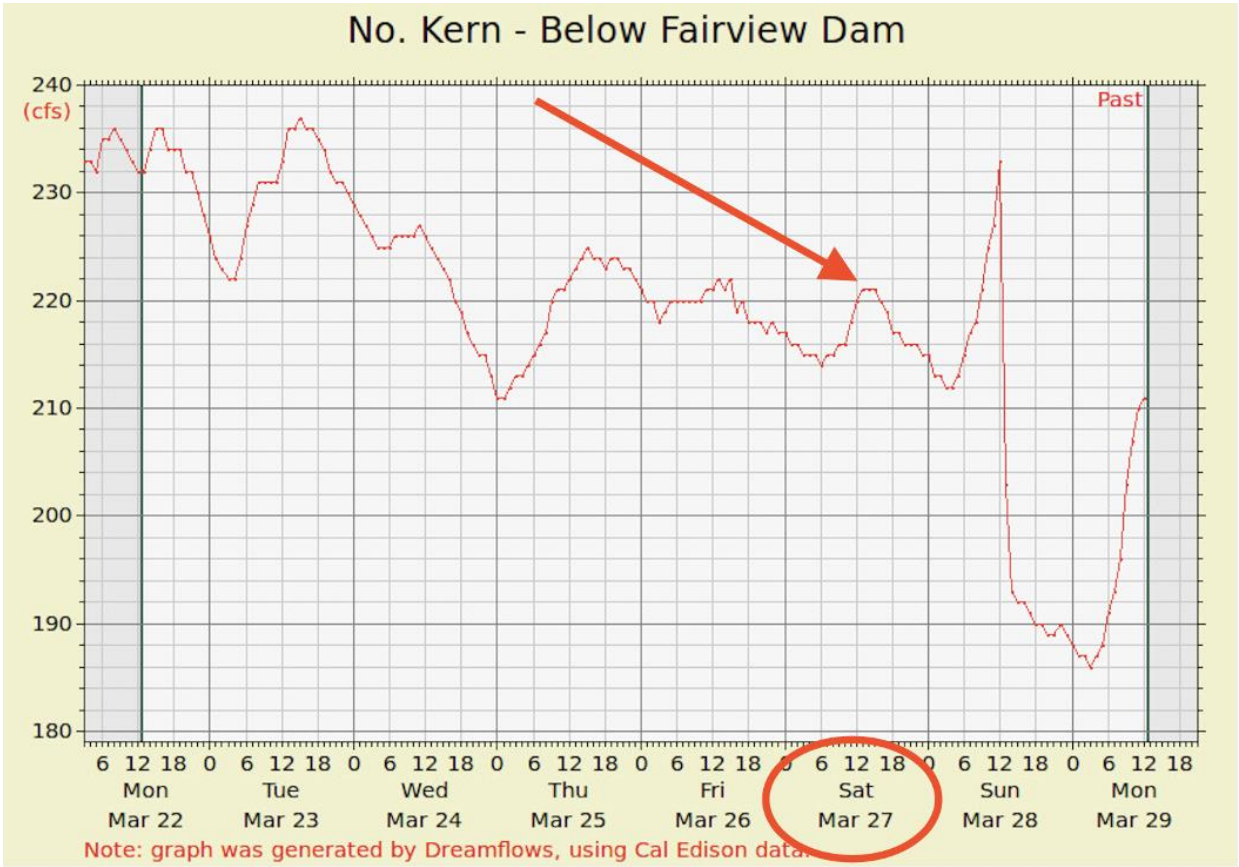
First is the influence of "creeking." Creek boating began on creeks — low water, sufficiently steep and channelized tributaries — and its popularity has expanded to low water, sufficiently steep and channelized rivers. The PAD concedes that the makeup of "Segment 1" — the first 7-mile stretch below Fairview Dam, including the popular Fairview, Chamise, and upper Ant Canyon runs — is more channelized and sports a higher gradient than Segment 2, making it more suitable for low water runs.

Second, boat designs have changed dramatically since 1994. Boat ergonomics have increased boater comfort while increased rocker, progressive rocker, and neo-displacement hull designs have made boats and boaters more comfortable with tight maneuvers and wet boulder engagements — to the point such experiences are pleasant and challenging features of whitewater recreation.

Third, boater skills have changed. In 1994, the "boof" stroke had yet to be born of its parent the "ski jump." The boof stroke enables boaters to keep the nose of the boat from submerging on steep drops. There are classes dedicated solely to teaching the boof stroke, and it is used to boater advantage on downspouts of water, wet boulder faces, or combinations of the two.

KRB is confident that a study conducted along the lines used in 1994 would return different results. Boaters able to negotiate the dewatered reach of the NFKR generally enjoy flows starting around 200 cfs in Segment 1. We have seen commenters in agreement during the last relicensing proceeding. We have also seen that whenever the project is offline and flows approach or exceed 200 cfs, boaters use Segment 1. Outfitters even *teach* kayaking on Segment 1 at those levels. On March 27, 2021, a Sierra South instructor and his student were seen getting ready for their *third* run of Chamise in Segment 1 for the day. The flow was 220 cfs:

Figure 46: March 27, 2021. 220 cfs at Segment 1



The Los Angeles Kayak Club has held its annual "cobwebs" event at flows of 230-260 cfs.[105] Big water daredevil Evan Moore recently admitted that even he enjoys paddling in Segment 1 at 200 cfs and is routinely seen paddling at those flows.[106]

[105] https://vimeo.com/90795991
[106] December 01, 2021 AW KR3 Meeting

No one would argue that enjoyable low flow boating is generally more enjoyable than boating at higher flows, or that those low flows should take precedence over higher flow opportunities. But low flow boating is enjoyable, worthwhile recreation, and the unimpaired NFKR provides many opportunities for it outside the runoff season when the project otherwise dewaters the river to the point where no such opportunities exist. These flows by definition occur at times when the project is operating at a small fraction of its capacity — If flows are 200-250 in late summer, fall, or early spring, the project only has about 50-200 cfs to work with, given the MIF, so it can only output 10-30 percent of its capacity. As such, generation losses incurred by protecting some of these lower flow opportunities for some periods of time would be relatively small. And they are worthy of protection: any managing agent who wishes to fully understand all of the incredible recreational opportunities being lost to project operations should take the six minutes needed to watch the following video, filmed at flows of 225-325 cfs — it is full of joy and beauty: TSC 40. Chamise Six 2016[107]

Figure 47: Shots of Segment 1 at 225-325 cfs

[107] https://vimeo.com/teamsocal/chamisesix2016

Edison: *In 2002, American Whitewater, Friends of the River, Natural Heritage Institute, and SCE signed a Settlement Agreement to resolve outstanding issues associated with USFS Section 4(e) Terms and Conditions, further refining the whitewater flow releases at the Project.*

Table 5.7-3. Whitewater Flow Release Schedule for the Project

Dates	Boating Days	River flow at Fairview Dam (cfs)	Minimum Whitewater Release (cfs)
April 1 up to the weekend prior to Memorial Day Weekend	Fridays and Weekends	1,000 to 1,300	700
		More than 1,700	1,400
Weekend prior to Memorial Day weekend until July 4	Daily	1,000 to 1,300	700
		More than 1,700	1,400
July 5 up to July 31	Weekends	1,000 to 1,300	700
		More than 1,700	1,400

Source: License Amendment Order January 30, 2019

cfs = cubic feet per second

(PAD at pp. 5-140 & 5-141.)

KRB: The settlement Edison describes was obtained without the participation of local boaters[108] and featured a rec flow schedule featuring a number of oddities and restrictions making it very unpopular amongst NFKR boaters.

First, the schedule prescribes "rec flow days" that involve no change in project operations. For example, if a rec flow day targeting a minimum of 1,400 cfs is triggered by previous day flows averaging 1,950 cfs and flows on the rec flow day are over 2,000 cfs, Edison does not have to change its operations at all: it can continue to divert the full 600 cfs it can take, since that sum subtracted from incoming flows of 2,000+ cfs will always satisfy the 1,400 cfs rec flow target.

Second, the schedule results in rec flow days that do not meet the targeted rec flow. For example, if a rec flow day targeting a minimum of 1,400 cfs is triggered by previous day flows averaging 1,750 cfs and flows on the rec day drop to 1,650 cfs, Edison need only allow 1,350 cfs into the diverted reach (short of the 1,400 cfs target) because of the 300 cfs "tunnel maintenance flow" limitation.

Third, the schedule calls for Edison to begin leaving the appropriate flow in the dewatered reach at 10:00 a.m. According to SCE, it takes the water 8-12 hours to travel the 16 miles from Fairview Dam to the powerhouse. That means the water does not get to the popular Cables run (about three miles upriver of the powerhouse, in segment 2) until 4:00 to 7:00 p.m.

[108] 109 FERC ¶ 61,018

Figure 48: Affidavit of Edison Hydrographer Tito, D.[109]

20130117-5142_P-2290 SCE Answer to Complaint of Brett Harding Duxbury.PDF

10. The Project's intake point and powerhouse are 16 miles apart. It takes approximately eight to 12 hours for water to travel from the release point through the recreational area. Matching the releases with real-time flow data from the recreational area is not possible because of this time delay.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 17, 2013.

Derrick Tito

Fourth, the schedule's multiple month and days of the week conditions are coupled with two very tight flow trigger windows (1,000-1,300 and 1,700-2,000 cfs). These multiple conditions make the schedule incomprehensible to all but the most committed boater.

Fifth, the previous day's average flow trigger windows eliminate any ability for a boater to plan for a rec day. The previous day's average flow is, by definition, not knowable until midnight — the start of the potential rec day. Many boaters have gone to bed thinking the next day was going to feature a rec flow (or missed) only to wake up and find that the previous day's average narrowly missed (or made) the window. No one has ever had a meaningful opportunity to plan for a rec day under the current schedule.

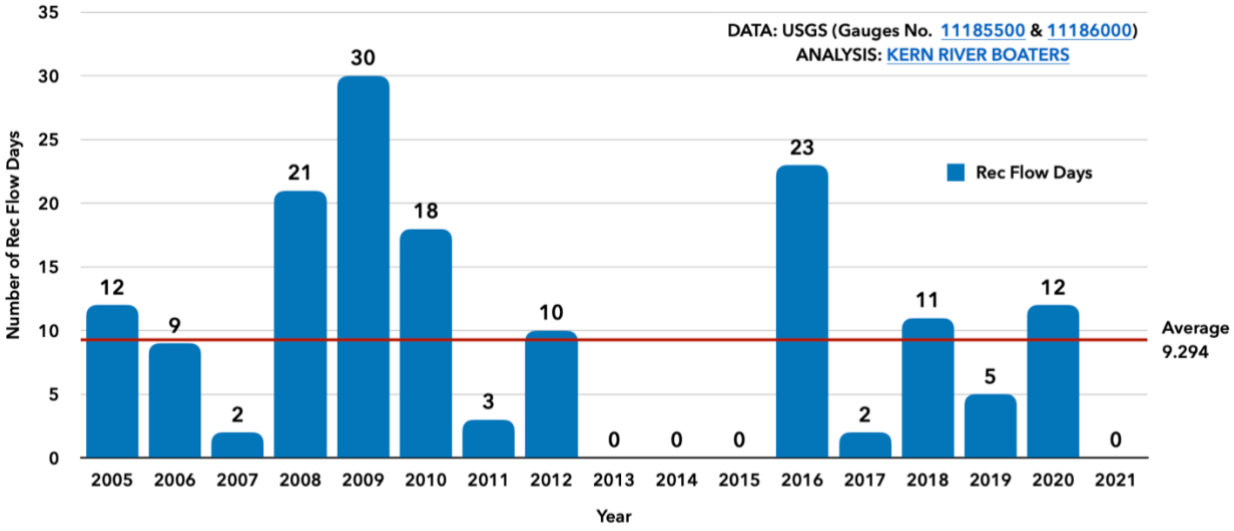
Sixth, the scope of mitigation provided by the schedule is trifling. The most water Edison is ever obligated to give up under the schedule is 300 cfs. However, since the rec flows are targeted floors (700 and 1,400 cfs), Edison rarely must give up the full 300 cfs; it need only give up enough flow to lift flows above the targeted floor. For example, if a rec flow day requires 1,400 cfs in the diverted stretch, and incoming flows on the rec day are around 1,850 cfs, Edison need only give up around 150 cfs of its diversion to get flows in the diverted reach up to the 1,400 floor. If incoming flows on the rec day fall below 1,700 cfs, Edison's obligation is capped at 300 cfs, max. And if incoming flows go over 2,000 cfs on the rec day, as shown above, Edison is not obligated to give up anything as indicated

[109] FERC eLibrary No. 20130117-5142 at Appendix A, p. A-2

above: 2,000 (incoming) – 600 (diversion) = 1,400 (below the dam). These same phenomena attend the 700 cfs rec day target.

Since Edison's obligation on a rec day falls somewhere from 0-300 cfs based on incoming flows — which over time are random in the relevant ranges — Edison on average need give up only 150 cfs from operations for a rec day. That is a small amount of additional water for recreation on this world class river. And the rec day loss to Edison only lasts for seven hours plus ramping time (about 1.5 hours worth at 150 cfs). The trifling nature of this obligation is underlined when one realizes that since this rec flow schedule was adopted, there have been an average of less than 10 rec flow days per year:

Figure 49: NFKR Rec Flow Days, 2005-2021



A "Rec Flow Day" gains boaters between 0 and 300 additional cfs (exact amount depends on instantaneous incoming flows at Fairview Dam) above the impaired flow below Fairview Dam for 7 hours.

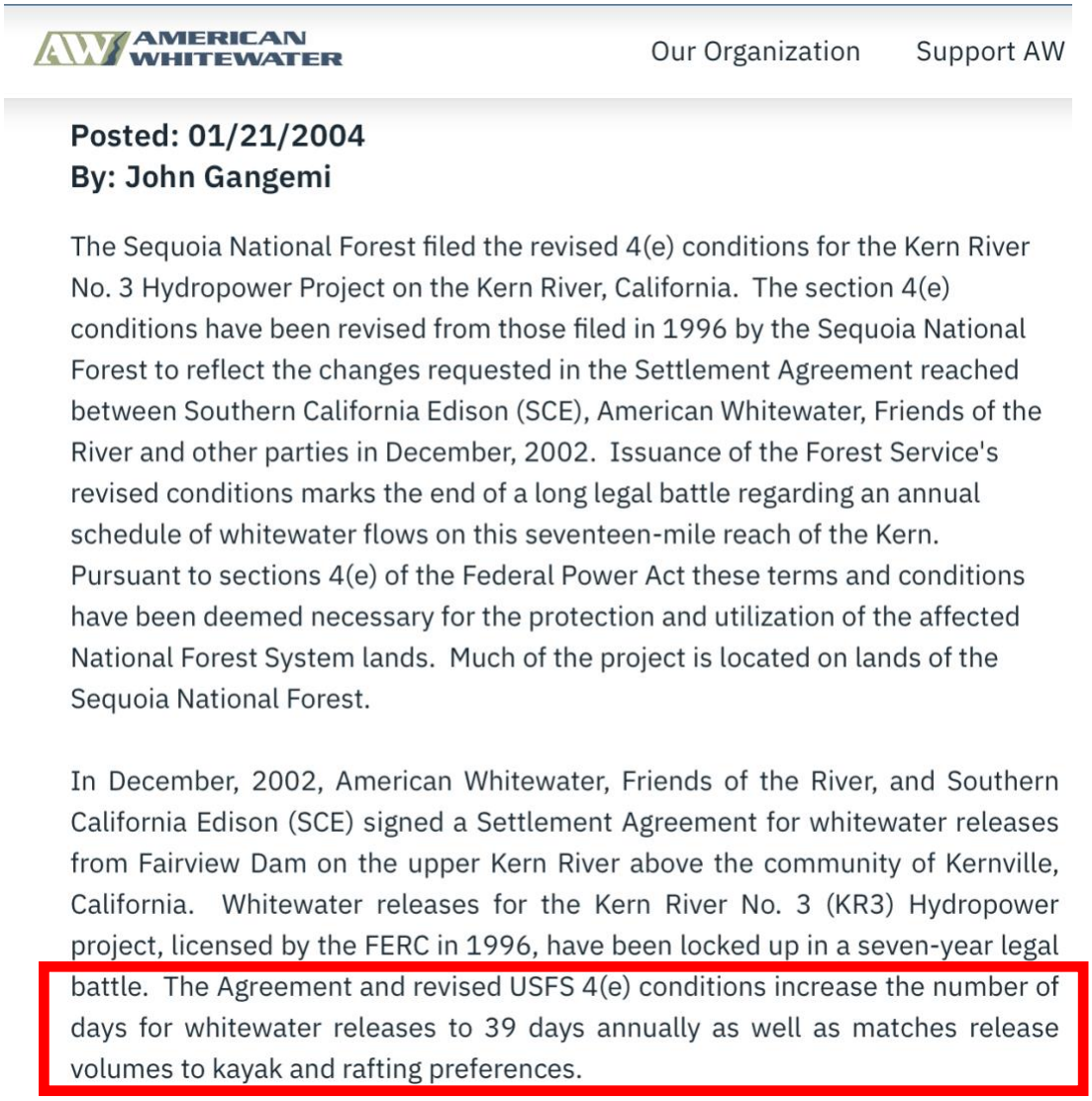
Over the course of the rec flow schedule with USGS data available (2004-2020), which covers 5,846 days, Edison diverted 115,621,862,400 cubic feet of water at Fairview Dam. (Average of 244.2 cfs over 5,480 days.) The rec flow schedule required Edison to give up 725,220,000 cubic feet (average of 150 cfs for 8.5 hours on 158 qualifying rec days) — just 0.6% of its take. This is a paltry concession given the protected status of this river for its outstanding recreational values and its importance to whitewater recreation for all Southern California.[110]

The final curiosity attending the settlement and its rec flow schedule is the misleading mitigation number Edison and its partners offered to the managing agencies and the public. The settlement's rationale touts the fact that it would entail "39 available boating days" in comparison to other proposed rec flow schedules.[111] American Whitewater highlighted that figure: "The Agreement and revised USFS 4(e) conditions ***increase the***

[110] FERC eLibrary No. 20220103 at pp. 14-54
[111] FERC eLibrary No. 20030106-0377, Rationale at p. 5

number of days for whitewater releases to 39 days annually as well as matches release volumes to kayak and rafting preferences."[112]

Figure 50: AW on the 2002 Settlement; 39 "Whitewater Releases"



AMERICAN WHITEWATER Our Organization Support AW

Posted: 01/21/2004
By: John Gangemi

The Sequoia National Forest filed the revised 4(e) conditions for the Kern River No. 3 Hydropower Project on the Kern River, California. The section 4(e) conditions have been revised from those filed in 1996 by the Sequoia National Forest to reflect the changes requested in the Settlement Agreement reached between Southern California Edison (SCE), American Whitewater, Friends of the River and other parties in December, 2002. Issuance of the Forest Service's revised conditions marks the end of a long legal battle regarding an annual schedule of whitewater flows on this seventeen-mile reach of the Kern. Pursuant to sections 4(e) of the Federal Power Act these terms and conditions have been deemed necessary for the protection and utilization of the affected National Forest System lands. Much of the project is located on lands of the Sequoia National Forest.

In December, 2002, American Whitewater, Friends of the River, and Southern California Edison (SCE) signed a Settlement Agreement for whitewater releases from Fairview Dam on the upper Kern River above the community of Kernville, California. Whitewater releases for the Kern River No. 3 (KR3) Hydropower project, licensed by the FERC in 1996, have been locked up in a seven-year legal battle. The Agreement and revised USFS 4(e) conditions increase the number of days for whitewater releases to 39 days annually as well as matches release volumes to kayak and rafting preferences.

However, in 2014 Edison conceded that the 39 rec day figure had been achieved by including days in which there would be no change to project operations: "[I]t is apparent that the [settling] parties were counting as recreational days all days when the total river flow met or exceeded 2000 cfs, and not merely those days on which SCE made recreational releases," said Edison counsel Kelly Henderson.[113]

[112] https://www.americanwhitewater.org/content/Article/view/article_id/1077/
[113] Kelly O'Donnell (Henderson), SCE Counsel, 17SEP2014 Email

Figure 51: Email from Kelly O'Donnell (now Henderson), Edison Counsel

And that is how the touted figure of "39" becomes "9.3" in practice.

Also regarding the settlement, we note that Edison "took advantage" of a USFS clerical error in adopting the settlement terms into its 4(e) recommendations. The error inadvertently removed the week before Memorial Day from the rec flow schedule. On February 27, 2014, USFS Recreation Officer Nancy Ruthenbeck wrote her colleagues that "The weeklong flows [before Memorial Day] *were very important to us.* In no way, did we expect to have [those flows unprotected] and I wasn't aware of what SCE was apparently doing until Mr. Duxbury filed his complaint. . . . Before SCE and the whitewater interests [reached] the settlement agreement, they approached us to see if we would be amenable to whatever they settled on. *We told them* yes, *as long as they abided by some sideboards* that we gave them. *The weeklong flows* [before Memorial Day"] *was one.*" (Italics added.) On March 03, Dennis Smith replied that "SCE had agreed up front to the original language *but has been taking advantage of our one word mistake* from the original settlement agreement between AW and SCE."[114]

[114] FERC eLibrary No. 20160428-5206 at p. 4

Figure 52: Edison "Took Advantage" of USFS Clerical Error

Porter, Roger W -FS

From: Smith, Dennis E -FS
Sent: Monday, March 03, 2014 2:16 PM
To: Rider, Joshua - OGC; Mulder, Cheryl -FS
Cc: Porter, Roger W -FS; Ruthenbeck, Nancy C -FS
Subject: FW: KR3 License Amendment

Joshua and Cheryl,

I don't think we need a prior call before we meet with SCE and AW (see Nancy's email below). Julie made a one word mistake when composing our 4(e) condition so we expect to correct that word with an explanation of the consequences. SCE had agreed up front to the original language but has been taking advantage of our one word mistake from the original settlement agreement between AW and SCE.

Dennis

Dennis Smith
USDA Forest Service
Pacific Southwest Region
1323 Club Drive
Vallejo, CA 94596
(707) 562-9176 (Office)
b6 [redacted] (Cell)

From: Ruthenbeck, Nancy C -FS
Sent: Thursday, February 27, 2014 7:01 AM
To: Porter, Roger W -FS; Smith, Dennis E -FS
Subject: RE: KR3 License Amendment

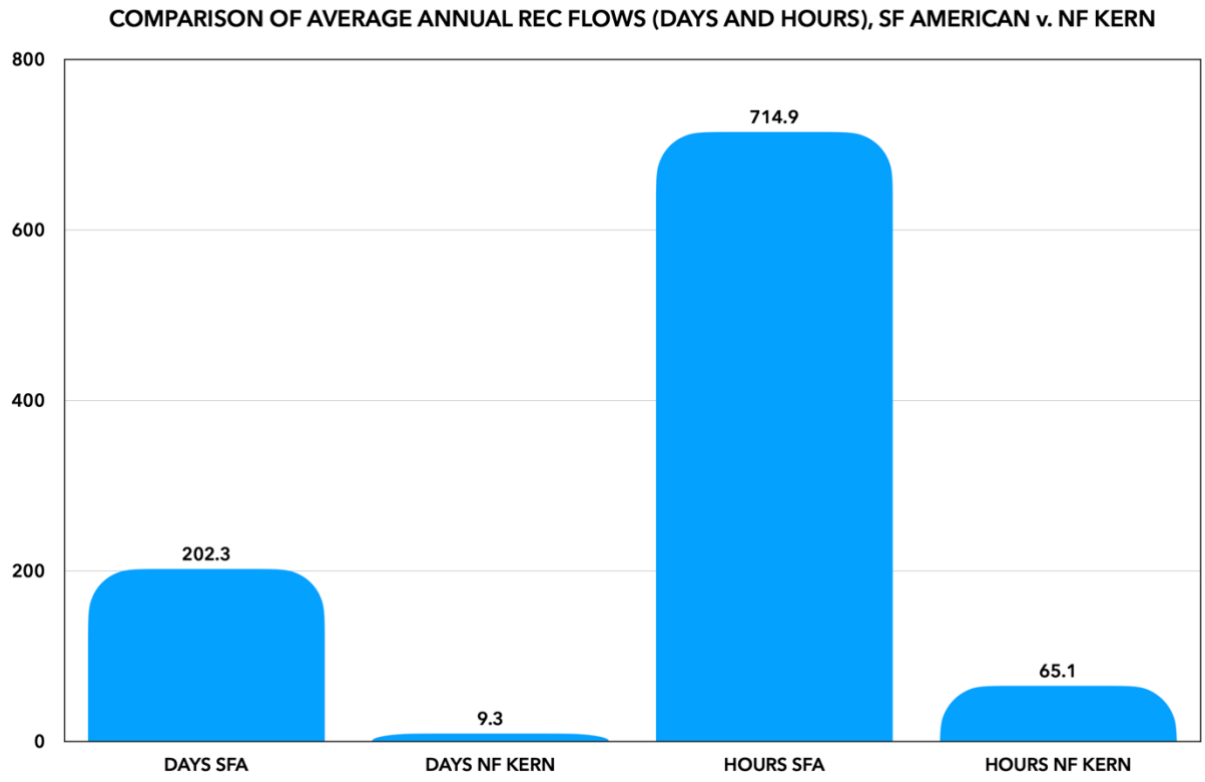
Yes. The weeklong flows were very important to us. In no way, did we expect to have a gap in the days when flows were available before Memorial Day weekend (the one flow regime ends the day before the next one begins). The table that was included in the 4(e)s had an inadvertent omission of one word ("weekend" after Memorial Day in the 2nd line of the table)—which had very important consequences—and I wasn't aware of what SCE was apparently doing until Mr. Duxbury filed his complaint.

Before SCE and the whitewater interests (represented by Richard Roos-Collins) entered into negotiations which led to the settlement agreement, they approached us to see if we would be amenable to whatever they settled on. We told them yes, as long as they abided by some sideboards that we gave them. The weeklong flows was one. (Not opening up the governing of the trust fund—which would have required the trust fund agreement itself to be reopened—was another sideboard.)

Nancy C. Ruthenbeck
Forest Recreation, Lands, & Minerals Officer
Sequoia National Forest
(559)784-1500, ext. 1130
nruthenbeck@fs.fed.us

We believe it is salient to compare the rec flow schedule for the dewatered reach of the NFKR with that of the South Fork American. Unlike Fairview Dam, the Chili Bar reservoir on the has significant storage, and releases between 1,300 and 1,500 cfs of that storage (compared to the average of 150 additional cfs on the NFKR) for three to five hours on rec days.[115] Notwithstanding the storage difference of the two systems — which we attempt to account for by not looking at comparative quantities of cfs provided, a number which would show an even greater disparity — the number of days and hours involved in the Chili Bar rec schedule demonstrates both contemporary social expectations for whitewater recreation and the amount of hydropower disruption tolerated to meet those expectations:

Figure 53: South Fork American v. NFKR Rec Flow Schedules



Edison: *The 700 cfs release provides additional whitewater opportunities in the narrower river channel in the Calkins Flat and Chamise Gorge, while the 1,400 cfs provides additional boating opportunities in the wider river channel found in the Gold Ledge run (Richards, 1994).* (PAD at p. 5-141.)

KRB: This is false. The settlement that set the NFKR rec flow schedule (and its targeted flow levels) specified that 700 cfs was needed for kayaks and 1,400 cfs was needed for

[115] https://www.smud.org/en/Corporate/Environmental-Leadership/Power-Sources/Upper-American-River-Project

rafts. In other words, the different water levels were targeted for different types of craft — not for different sections of the dewatered reach.

Figure 54: Settlement Rationale[116]

4. The whitewater interests, as represented by American Whitewater and Friends of the River, through the experience of their members and discussions with local commercial and private boaters, believe that a flow in the Project bypass reach of at least 700 cfs is reasonable to allow for kayaking in the bypass reach.

5. The whitewater interests, as represented by American Whitewater and Friends of the River, through the experience of their members and discussions with local commercial and private boaters, believe that a flow in the Project bypass reach of at least 1,400 cfs is necessary to allow for rafting in the bypass reach. Kayakers will continue to be able to recreate in the bypass reach with this higher flow.

American Whitewater, Friends of the River and certain commercial outfitters operating on the Kern River have attempted to identify critical flow thresholds for the bypass reach below Fairview Dam. These thresholds represent their opinion as to the minimum acceptable flows for whitewater recreation in respective watercraft. Flows less than the minimum acceptable flows may result in safety problems due to the shallowness of the river channel and numerous obstructions for safe passage.

Edison: *SCE publishes preliminary real-time hourly flow information for the Kern River below Fairview Dam (SCE Gage No. 401), KR3 Canal Flow (SCE Gage No. 402), and a calculated inflow at Fairview Dam (sum of gages 401 and 402)* (PAD at p. 5-141.)
KRB: On April 29, 2021, David Moore of SCE promised to provide managing agents and stakeholders the record of this hourly flow data by spring 2022. The main characteristic of the project is that it removes water from the river. Stakeholders, managing agencies, and the general public cannot be expected to capture and comprehend the effects of the project on this protected stretch of river without hourly flow data.

Edison: *The USACE operates a streamgage downstream of the Project in Kernville and provides hourly streamflow data.* (PAD at p. 5-141.)

[116] FERC eLibrary No. 20030106-0377, Rationale at pp. 2-3

KRB: Edison cites a USACE webpage that reports hourly data, but the USACE gauge reports in more frequent increments than that, as seen on its Dreamflows page.[117] Data in more granular increments is helpful for boaters attempting to paddle during storm events, when the rates of flow fluctuate at much greater and less predictable rates than during a storm-free diurnal. The managing agencies should consider requiring Edison to provide 15-minute data to the public in any new license.

5.7.4.2. Angling and Swimming

Edison: *Opportunities for angling and swimming occur throughout the Fairview Dam Bypass Reach*. (PAD at p. 5-141.)

KRB: Many anglers do not find fishing in the dewatered reach of the NFKR enjoyable at levels below 100 cfs. Whether it comes to whitewater boating or angling, there are relatively few people in those respective communities who strictly and routinely keep track of the correlation between flow levels and the attendant quality of recreation at various sections of the river. The Kern River Fly Fishing Club is the oldest angling community organized around the Kern River[118], and Rich Arner is one of the club's flow specialists. Mr. Arner has published a blog for the club for more than 15 years.[119] Mr. Arner's judgment on the quality of angling in the dewatered reach of the NFKR (referred to as the "low flow section" or "section 5") has been consistent: flows below 100 cfs are neither healthy for the fishery nor enjoyable for anglers.

> Flows (50 cfs) are very low on section 5 below Fairview and there is lots of wadable water there, however, the extremely low flows have given natural predators a distinct advantage over unwary rainbows. (11/20/19.)
>
> Also the low flow section has been dropped to just 45 cfs. That's nearly a trickle and natural predators are having easy pickings on trout that surface often and do not find good lies in deeper pools with cover. (11/07/19.)
>
> Section 5 is flowing very low (just 85 cfs) and deeper hiding water is becoming less abundant. Dries not getting as many grabs. Shallower water is giving herons a distinct advantage in spotting unwary planters.
> (10/22/19.)

---

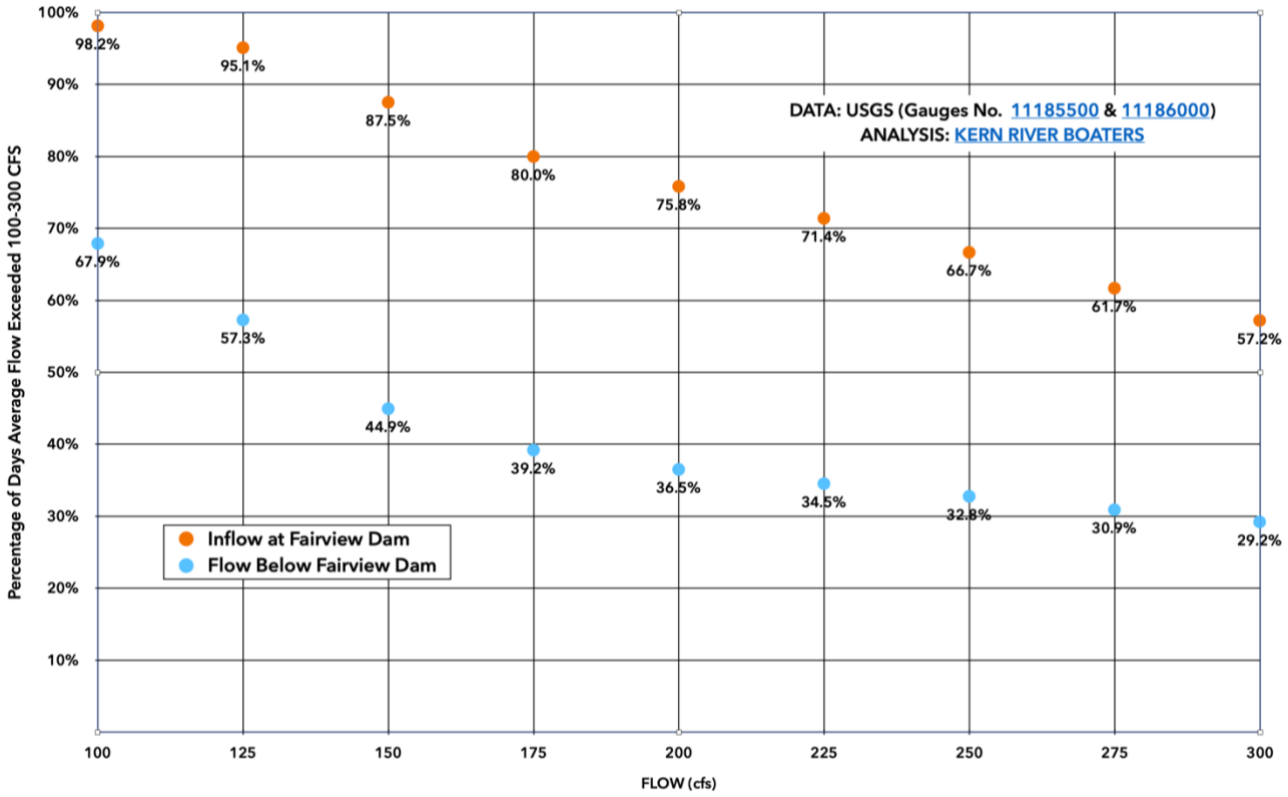
[117] https://www.dreamflows.com/graphs/day.104.php
[118] http://www.kernriverflyfishers.com/index.html & https://www.facebook.com/kernriverflyfishers
[119] http://www.kernriverflyfishers.com/fishreports.htm

> We love section 5 to wade but flows have dropped down to just 86 cfs, above Fairview on section 6 flows are holding steady at 350 cfs. . . . There is a lot more moss in the river, especially on section 5 where water temps exceeded 70 degrees the last month of summer. This moss had larvae strewn in it. Did this lunker consume the moss to get at the aquatics insects or just dive into the moss containing larvae trying to evade landing? Who knows? (10/03/19.)
>
> We hit a favorite spot on section 5 that should have been stocked last week. Water was very low and 50 degrees. We hit every spot that has held trout in the past with nary a tug nor rise. There was quite a bit of moss covering the river rocks (1/4 – 1/2" thick) that I can't say I've ever seen before. Made traction better but did not seem to provide more aquatic insect activity? Not sure what biologically is going on. It was pretty obvious to us that the water on section 5 is too low to sustain trout for long. If trout planted on much of this section weren't harvested by fishers it sure would be easy pickings for herons and hawks. There is very little holding water more than 3' deep with these very low flows around 50 cfs. We tried another social media posted spot further up river on section 5 to see if there were any trout left there but no trout tugs were procured. So up to section 6 where there has been some catching reported the last month. . . . We tried another often stocked area low on section 5 on the way home and covered a good 1/2 mile stretch with no grabs nor trout seen scooting. The water is just too low to hold trout for long. (11/8/18.)
>
> [F]lows between Fairview Dam and KR3 power generation station are just 50 cfs today. That's as low as we can remember. Any trout left (very few survived 80 degrees temps last summer) on that stretch are going to find it hard to avoid being taken by natural predation and other harvesters. (03/06/16.)[120]

Over the POR for this license, the average daily flow above Fairview Dam fell below 100 cfs just 151 days out of 8,766 — about 1.7% of the time. During the same period, the average daily flow in the dewatered reach below the dam fell short of 100 cfs on 2,790 days — about 31.8% of the time. The project takes a large chunk out of fishable flows in the dewatered reach:

[120] http://www.kernriverflyfishers.com/fishreports.htm

Figure 55: : NFKR Exceedances, 100-300 cfs, 1997-2020



Recall that these figures are confounded by the large number of days KR3 was either completely (1,455) or partially (at least hundreds more) offline during the POR.

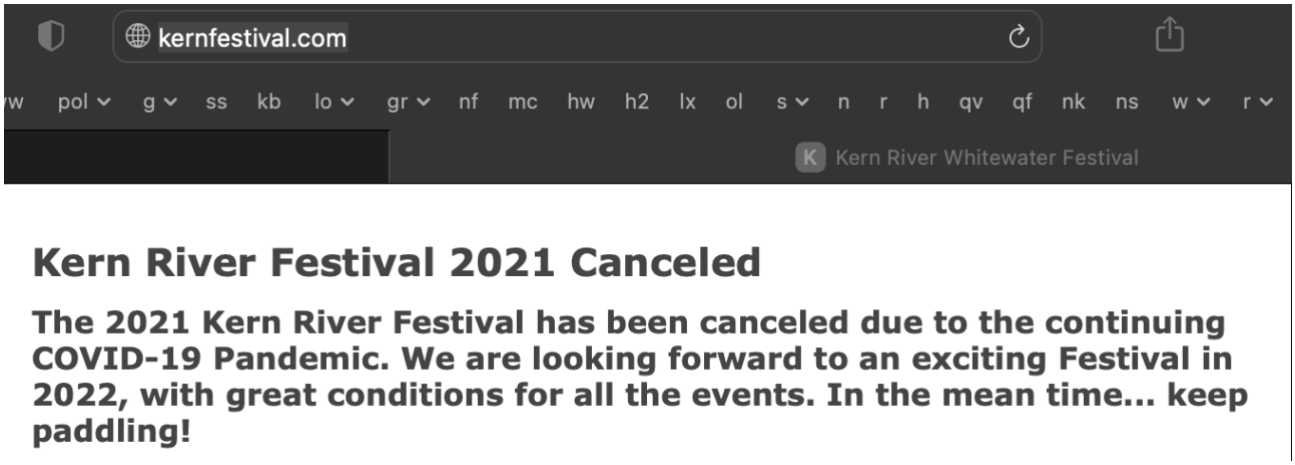
The sole reason for these large differences in flow frequency above and below Fairview Dam is the dam itself and the project it serves. The minimum level of flow required for an enjoyable angling experience has not been studied in the dewatered reach of the NFKR, and there is reason to believe that level is frequently denied to the public due to project operations.

Edison: *The river is also used for swimming, generally at locations near camping or day-use areas.* (PAD at p. 5-141.)
KRB: Edison does not describe how many days per year unhealthy elevations of bacteria or metalloids in the dewatered reach could be avoided with additional flows to dilute them. The managing agencies should study this question.[121]

Edison: *In 2020, the Kern River Festival was canceled due to poor snowpack resulting in lack of water in the Kern River watershed.* (PAD at p. 5-146.)

[121] See *supra*, § 5.2.4.4. Additional Water Quality Parameters

KRB: After being held for 50 consecutive years, the Kern River Festival was cancelled in 2015 by the Kern Valley River Council on account of inadequate flows.[122] KVRC cancelled the festival again in 2020 — due to the pandemic, not flows — and again in 2021 for the same reason.[123]



The Kern Valley River Council has indicated that the Kern River Conservancy would manage future operations of the festival.[124]

5.7.5.3. Trails

Edison:

- Whiskey Flat Trail
  - Whiskey Flat Trail is a 12.4-mile out-and-back trail located between Kernville and Cannel Creek confluence, roughly paralleling the NFKR along the west bank. The trail can be utilized one-way or as an out-and-back. The trail is open year-round to hikers and mountain bikers. Dogs and horses are also allowed on this trail.

(PAD at p. 5-147.)

KRB: The Whiskey Flat Trail goes along the west side of the NFKR from the north end of Kernville to the town of Fairview. The trail has 2 trailheads and is thus not an "out-and-back" trail.

5.7.7. National Wild and Scenic River System

Edison: *The NFKR is designated "recreational" from the county line upstream to the Giant Sequoia National Monument; and designated "scenic" upstream to the headwaters)*. (PAD at p. 5-151.)

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[122] https://www.latimes.com/local/california/la-me-ln-kern-river-dead-20170529-htmlstory.html
[123] http://kernfestival.com
[124] 2020 USFS Outfitters' Meeting

KRB: Rivers are designated Wild and Scenic. They are *classified* as wild, scenic, recreational, or some combination thereof. Regardless of the nature of their classification, managing agencies are mandated to protect and enhance every river designated Wild and Scenic. (16 U.S.C. §§ 1271 *et seq*.)

The USFS Comprehensive Management Plan for the Wild and Scenic Kern states that the development of "new hydroelectric power facilities is prohibited. The existing diversion project located on the North Fork [KR3] will be allowed to remain, *subject to FERC licensing*, as authorized by the Wild and Scenic River Act."[125]

FERC licensing (and relicensing) is governed by the Federal Power Act, which calls upon FERC to give equal consideration to developmental and non-developmental values in designing a license best adapted to competing beneficial uses of the affected resource.[126] The FPA also calls upon USFS to develop mandatory conditions necessary for the protection and utilization of the Forest.[127]

In that regard, USFS is obliged to secure "river and similar water recreation opportunities to meet the public needs . . . and enhance the values for which [NFKR was] established [as Wild and Scenic]."[128]

Nothing in the fact that the Wild and Scenic River Act grandfathered the project weakens the FPA mandate for FERC and USFS to secure the public interest in the use of this outstanding public resource: "power development is not to be considered an absolute priority under the Act or given undue weight. It is intended that the Commission give significant attention to, and demonstrate a high level of concern for all environmental aspects of hydropower development, even, if necessary, *to the point of denying an application on environmental grounds*." [129] "Projects licensed years earlier must *undergo the scrutiny of today's values* as provided in this law and other environmental laws applicable to such projects."[130] Relicensing is substantially equivalent to issuing an *original* license — akin to making a new, irreversible commitment of a public resource, not just a referendum on the continuation of the *status quo*: "Simply because the same resource has been committed in the past does not make relicensing a phase in a continuous activity. Relicensing involves a new commitment of the resource, which in this case lasts for forty years."[131]

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[125] USFS WSKR CMP (nd) at p. 15 (italics added)
[126] 16 U.S.C. § 803(a)(1); *see also* § 797(e)
[127] *Southern California Edison v. FERC*, 116 F.3d 507 (D.C. Cir. 1997)
[128] USFS WSKR CMP (nd) at p. 3
[129] H.R. Conf. Rep. No. 934, 99th Cong., 2d. Sess. at p. 21-25 (italics added)
[130] *Id*., at p. 22 (italics added)
[131] *Yakima v. FERC*, 746. F.2d 466, 476-477 (9th Cir. 1984)

5.9.3.1. Tulare County General Plan

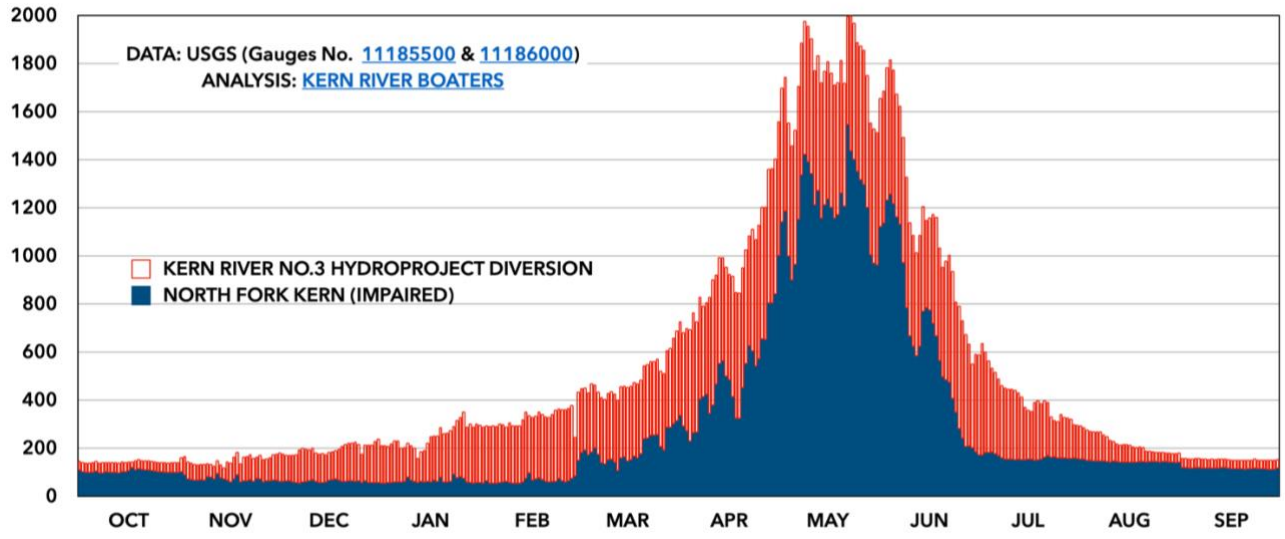
Edison: *Goal SL-1.3 Watercourses: The County shall protect visual access to, and the character of, Tulare County's scenic rivers, lakes, and irrigation canals by . . . Maintaining the rural and natural character of landscape viewed from trails and watercourses used for public recreation*. (PAD at p. 5-160.)

KRB: The aesthetic quality of a river is flow dependent. One need simply note that Edison chose to locate its project control house on the fully watered side of the project — downstream of the powerhouse, that is, and not on the upstream side, where flows are significantly impaired.

Literature on the topic indicates: (1) riverside recreational opportunities are enhanced by the aesthetics of moving water; (2) flows have significant effects on overall scenic evaluations; and (3) recreation users can specify evaluations of flow levels. The literature also suggests that aesthetic judgments by trained professionals may not match those of the general public.[132]

After the minimum instream flow is satisfied, the project takes the next 600 cfs. That leaves the dewatered reach at a flat-lined fish flows for two-thirds of the year:

Figure 56: Median NFKR Flows, 1997-2020



The level of flow required for an aesthetically enjoyable experience from key viewing points along or near its shores (Whiskey Flat trail to the west; USFS campgrounds, and Mountain Highway 99 to the east) has not been studied and may be closer to natural flows than fish flows. The managing agencies should study the issue. Indeed, it is the objective of the USFS to "strive for higher visual quality" in the protected reach.[133]

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[132] Whittaker *et al.*, Flows and Aesthetics (2017)

[133] USFS CMP WSKR (nd) at p. 45

5.9.3.2. Kern County General Plan

Edison: *Policy 3.2.3.1.4: Kern River Open Space Policy—Land developments which would detract from the scenic quality of the Kern River shall be screened by vegetation, fencing, or landscaped berms, or be located in a reasonably inconspicuous manner.* (PAD at p. 5-161.)

KRB: The KR3 forebay and penstocks — "the pipes," as locals call them — sit atop what would otherwise be a stunning scene of the natural hills of the Southern Sierra north of Kernville, which has been characterized a "high scenic integrity" zone.[134] Some have likened the penstocks to a scar on a beautiful face. They are seen from many houses in Kernville, some of the commercial areas in town, and along the Whiskey Flat trail. The managing agencies should account for this cost to public aesthetics and evaluate whether there are measures to be taken to remove these traces of the project from the hillside through burial or other means.

Figure 57: The Pipes

5.9.3.3. Sequoia National Forest Land and Resource Management Plan

Edison: *The 1988 plan is in the process of being updated. . . . The Revised Draft Land Management Plan for the Sequoia National Forest (USFS, 2019) is used in this section when describing and evaluating aesthetic resources in the Project Area, but may be subject to revision pending issuance of the final plan.* (PAD at p. 5-162.)

KRB: Edison cites no authority for reliance on a draft management plan that may be meaningfully altered before its publication. Until such publication, the 1988 management plan remains in force. It calls for USFS to require that at least 50% of incoming flows at Fairview Dam remain in the natural riverbed below.[135] As for why USFS chose not to pursue that mandate in the last proceeding, it averred: "This FLMRP guideline was not brought up

[134] PAD at p. 5-167 & Figure 5.9-1

[135] USFS SQF Federal Land Resource Management Plan (1988) at p. 4-28: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5400303.pdf

for discussion until the licensing process was nearing completion."[136] KRB brings it up at the earliest stage in this proceeding; until directed otherwise, USFS should follow its mandate to secure those flows.

Edison: *Desired Conditions (SCEN-FW-DC) 03: Scenic integrity is maintained in places people visit for high quality viewing experiences. . . . Guidelines (SCEN-FW-GDL) 01: Management activities should maintain or move toward scenic integrity objectives in the long-term timeframes.* (PAD at p. 5-163.)
KRB: USFS should support the study and rectification of the aesthetic issues raised above (*e.g.*, aesthetically pleasing flows and making the penstocks more inconspicuous).

Edison: *Desired Conditions (DA-WSR-DC) 01: The free flowing condition, water quality and specific outstandingly remarkable values of designated wild and scenic rivers are protected or enhanced. Development is consistent with the river's classification, and management is consistent with a current comprehensive river management plan. . . . Proposed and Possible Action (Wild and Scenic Rivers): Through partnerships with other agencies, organizations, and volunteers, help maintain and enhance the outstandingly remarkable values of each designated and eligible wild and scenic river.* (PAD at p. 5-163.)
KRB: The mandate to protect and enhance the dewatered reach of this protected river should encourage USFS and like-minded agencies to limit Edison's diversion of water for generation much more greatly and use those flows to serve the natural fishery, the surrounding ecosystem, the river flow aesthetic, public health, and public recreation.

[136] USFS Notice of Decision and FONSI (1998) at Appendix E, p. 8; FERC eLibrary No. 19980918-0354, available: https://www.kernriverboaters.com/s/USFS-NOD-FONSI-1998.PDF

Figure 58: Edison removing about 550 of the available 600 cfs at Fairview Dam

5.9.6.3. Water Conveyance System

Edison: *Of the 4,600 feet of concrete flume, 3,582 feet are covered and 1,705 feet are uncovered*. (PAD at p. 5-169.)

KRB: Edison does not explain why so much of its conveyance is uncovered. A flume in an uncovered state would appear to present an attractive nuisance to humans and wildlife alike.

Also, as these pictures taken on December 02, 2021 of a short portion of the conveyance near the forebay illustrate, the conveyance is often in a state of disrepair:

Figure 59: KR3 Conveyance, December 02, 2021

5.10.2. Area of Potential Effects

Edison: *The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" [36 CFR § 800.16(d)]. SCE proposes that the APE for the Project include all lands within the FERC Project Boundary.* (PAD at p. 5-170.)

KRB: The proposed APE is too narrow. At the December 03, 2020 TWG meeting, SCE consultant Audrey Williams conceded that the river itself could be considered a cultural resource given the contemporary role it plays in the lives of locals and visitors. The project alters the river's constituent parts in a meaningful way and as such alters its character and the manner in which it interfaces with the public. The APE should include the river and its surroundings as a project-affected area for cultural analysis. As Edison characterizes it elsewhere, "The Project is situated *on* the NFKR and on Salmon and Corral Creeks."[137] This project is "on" this Wild and Scenic river. The consequences of the project's existence on modern culture — in terms of our ceremonies, rituals, solemn occasions, manners of life — have not been studied. KRB is a nonprofit, all-volunteer group — none of our members gets paid or has a financial interest in our mission — and we did not have the resources to draft a study request that includes the river as a cultural artifact. KRB invites the managing agencies to pick up that ball. At a minimum, the Commission should extend the APE for cultural analysis — indeed, for all resource categories — to include the protected river and river corridor upon which the project resides.

5.10.5.3. Historic Period

Hydroelectric Development

Edison: *On April 1, 1921, the KR3 Powerhouse turned on its first generator and began supplying power to the Kern Valley (Mikesell, 1989).* (PAD at p. 5-189.)

KRB: April 1, 2021 has come and gone without a community celebration of KR3's centennial.

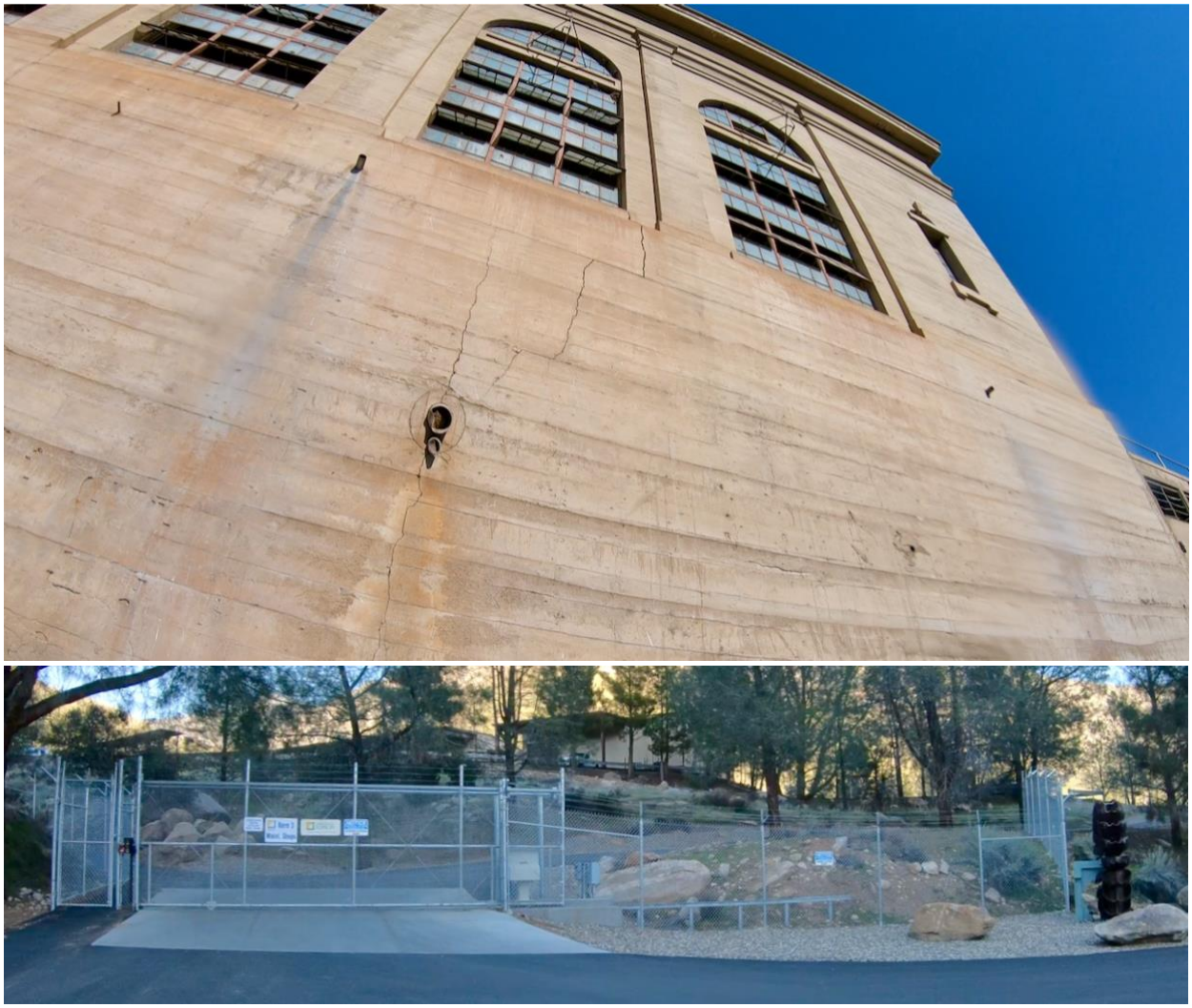
5.10.6.3. Kern River No. 3 Hydroelectric Project Historic District

Edison: *The powerhouse is a reinforced concrete building designed in the Mediterranean Revival style.*

KRB: The powerhouse is characterized by cracked and stained concrete and its control house is protected by an aggressive security fence at seeming contrast with the surrounding environment.

[137] PAD at p. 5-240 (italics added)

Figure 60: The Powerhouse and the Security Fence



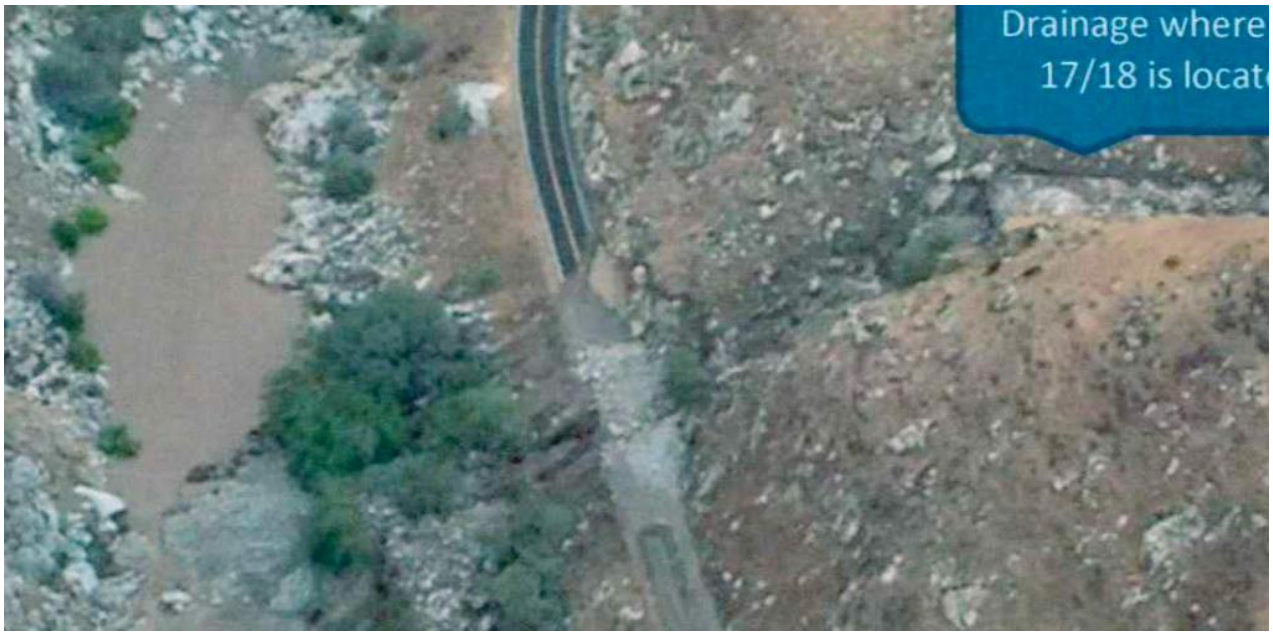
Transportation

Edison: *Local highways are crucial for the ongoing success of the economy and development of the local communities of Kernville and Isabella.* (PAD at p. 214.)

KRB: The movement of millions of gallons of water every minute high above Mountain 99 and subject to the contingencies of faults and storms poses a threat to lives, property, and infrastructure like that posed by the Kern River No. 1 (P-1930) hydroproject:

Figure 61: Kern River No. 1 Landslide[138]

[138] https://www.bakersfield.com/columnists/lois_henry/lois-henry-mother-nature-got-help-shutting-down-hwy-178/article_2378aaf7-7ab2-594a-97ec-4091ce4d1ddc.html ("Henry 2014")



On August 19, 2013, a catastrophic failure occurred at KR3's sister project, Kern River No. 1 (FERC Project No. P-1930, "KR1"). A summer storm set loose water and debris that penetrated the project's conveyance and clogged its penstocks and emergency spillway. Water crested the forebay and deluged the mountainside below, "severely" eroding the mountain and causing a landslide that closed Highway 178 — the Kern River Valley's primary artery — in both directions for ten days.[139] The project continued diverting water to the forebay thus increasing the spill throughout the event. As a result of this incident, the Commission increased the hazard rating for the project from "low" to "significant."[140]

The risks inherent in KR3 should be studied through the lens of the KR1 incident because many of the same risk factors apply. Like KR1, KR3 conveys a large volume of moving water (again, 2,309,524 pounds per minute) at elevated levels above a highway. Mountain 99 is not travelled as much as Highway 178, but that would not matter to vehicles and passengers who happened to be on it during a catastrophic landslide. Moreover, KR3 conveys 50% more water than KR1.[141] Finally, the elevated assets of KR3 at issue are less than two miles from a major fault.[142]

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[139] Henry 2014; FERC eLibrary Nos. 20131007-0307 & 20131104-5010
[140] FERC eLibrary No. 20140325-0159
[141] PAD at p. 3-7
[142] See: https://pubs.geoscienceworld.org/gsa/geosphere/article/8/3/581/132511/Map-of-the-late-Quaternary-active-Kern-Canyon-and

5.12. Socioeconomic Resources

Edison: *This section provides a general description of the socioeconomic conditions in the vicinity of the Project.* (PAD at p. 5-239.)

KRB: Edison fails to point out that project effects on the protected river corridor fall disproportionately on economic and environmental justice communities.

Noncommercial recreation in the protected river corridor is free — whether near the river or in it. And camping in the corridor is either free (in undeveloped sites) or available at a nominal charge amounting to less than $10 per person for an average sized family or group. There are limited opportunities for quality recreation in Southern California at these prices. Moreover, as Southern California's principal river, the Kern plays an important role in introducing members of the community to the natural beauty that a watershed has to offer. Beyond the aesthetic cost project facilities impose on and near the corridor, the principal project operation of removing water from the river at Fairview Dam imposes its own costs in the aesthetic nature of flows in the river[143], in the health of the river fishery and its riparian ecosystem[144], in the quality of the water in the river[145], and in the quantity of water in the river for contemplation, amazement, fishing, tubing, or boating.[146] Those costs are most heavily borne by communities of low incomes, who tend to live in environmentally challenged areas and who do not have as much disposable income to seek replacement activities of equal quality. Project operations accordingly have a disproportionate impact on economic and environmental justice communities.

6.2. Relevant Qualifying Federal or State and Tribal Comprehensive Waterways Plans

Edison: *This plan is currently under revision by the USFS and the updated plan will be reviewed when finalized.* (PAD at p. 6-9, fn. 1.)

KRB: Edison fails to note that the CDFW Strategic Plan for Trout Management is also under revision. The latest draft of that plan notes that hydropower has left many of this state's rivers unhealthy:

> Objective: By 2023, Fisheries Branch in conjunction with Regional staff will create a list of high-quality trout waters currently impaired from dam and diversion operations, or those that could benefit from revised flow regimes. . . .

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[143] See *supra*, at § 5.9.3.1. Tulare County General Plan

[144] See *supra*, at §§ 3.7. Major Water Uses, 4.5.1. Water Management, 5.3.3. Aquatic Habitat & 5.7.4.2. Angling and Swimming

[145] See *supra*, at § 5.2.4.1. Water Quality Objectives from Basin Plan & 5.2.4.4. Additional Water Quality Parameters

[146] See *supra*, at §§ 5.7.4.1. Whitewater Boating & 5.2.3.3. Hydrology

> Seasonally, river flows that mimic natural and historic flow regimes have been shown to be beneficial to fish communities . . . .
> A natural flow regime for trout means maintaining seasonally appropriate minimum flows for target species and their life stages present, attractant flows for migrating fish, additional flows for spawning fish, and periodic high flow events for channel restoration and to limit non-native species abundance. . . .
> Objective: By 2023, Fisheries Branch in conjunction with Regional staff will create a list of high-quality trout waters that are currently affected by water operations that could benefit from more natural flow regimes. . . .
> Objective: By 2022, Fisheries Branch in conjunction with Regional staff will develop a list of restoration needs for high-priority trout waters. . . .
> While minimum flow standards and adjudicated systems exist for some rivers, many fisheries would further benefit by leaving additional flows appropriated for environmental use. Conservation-minded stakeholders should be identified in watersheds and provided opportunities to engage in an acquisition or water transfer program (Water Code § 1707).[147]

6.2.1. Other Relevant Documents

KRB: Edison fails to include the following relevant documents:

> (1) CDFW Instream Flow Program: "The CDFW Instream Flow Program (IFP) develops instream flows required to maintain healthy conditions for aquatic and riparian species. Instream flows are determined by investigating the relationships between flow and available stream habitat for waterways throughout California . . . ."[148]
> (2) CEFWG Environmental Flows Framework: "The California Environmental Flows Framework is a management approach that provides technical guidance to help managers efficiently develop scientifically defensible environmental flow recommendations that balance human and ecosystem needs for water."[149]

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[147] CDFW Draft Strategic Plan for Trout Management (2021) at pp. 23-24 & 26: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=193588&inline

[148] https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Docs

[149] https://ceff.ucdavis.edu/sites/g/files/dgvnsk5566/files/media/documents/CEFF%20Technical%20Report%20Ver%201.0%20Mar_31_2021_DRAFT_FINAL%20for%20web.pdf

Appendix E. Draft Study Plans
REC-1 Whitewater Boating Resource Evaluation
3.0 Study Goals and Objectives

Edison: *Estimate the potential whitewater boating use under minimum acceptable flow conditions in the Fairview Dam Bypass Reach and use in the whitewater segment directly downstream of the KR3 powerhouse.* (PAD Appendix at REC-1 p. 1.)

KRB: Edison proposes to compare recreation in the impaired flow stretch above the project powerhouse and the free-flowing stretch below the project powerhouse. This objective is problematic, for three reasons:

First, the two reaches demand much different skill levels. The stretch below the powerhouse requires little to no "boat control" — the ability to move a boat to particular positions in a rapid while navigating in turbulent and uneven flows. This is a difficult skill to master and one that separates boaters along a continuum from beginner to expert. The stretch below the powerhouse also presents a relatively small danger of a long, rocky, or dangerous swim. These are reasons that beginners begin boating whitewater and continue developing their boating skills in the stretch below the powerhouse. By contrast, the dewatered stretch above the powerhouse demands much greater boat control skills and presents much greater hazards. Since boater skill levels can best be represented on a declining distribution from beginner to expert, it is axiomatic that more boaters would be capable of recreating in the stretch below the powerhouse than the stretch above.

The second problem with the objective is that the character of the two stretches are quite divergent — indeed, the dewatered stretch is protected for its outstanding recreational values; the stretch below the powerhouse is not. The character of the two stretches — above being for people who have developed and honed whitewater skills, below being for people beginning to develop those skills — is markedly different. Moreover, the project's effects on the less valuable stretch are minor and fleeting and can be avoided if Edison, for instance, chose to dewater its conveyance for maintenance at sunset. The project's effects on the protected stretch, by contrast, are major and constant. The salient issue in this proceeding is to capture all of the project's effects on the protected stretch.

The third issue is that the plan proposes to compare the two stretches while different flow levels are in each. It makes no sense to compare the amount of recreation in a project-dewatered reach to an unimpaired reach below when considering potential opportunities for mitigation of the effects of that project. A rational comparison would establish the same water level in both stretches — *i.e.*, turn off the diversion — and publicize that fact at least a month prior to the event(s). Managing agencies cannot capture the full effect of the project on recreation in the dewatered stretch in a comparison *with a project-affected day*. The playing fields must be leveled with equal flows, and in a way that mimics what a whitewater rec flow schedule would entail — *i.e.*, with public notice.

3.1.1. Existing Project Facilities

Cannell Creek Siphon and Spillway

FERC: *Water from the conveyance flowline may be released from the concrete reservoir into a 45-foot long concrete spillway and approximately 470-foot long, rock-lined spillway channel down to Cannell Creek. These water releases may occur if excess tunnel pressure needs to be reduced or water in the flowline need to be drained.* (SD1 at p. 8.)

KRB: These releases may disturb the habitat of the Western Pond Turtle. (See *supra*, § 5.3.7.1. Special-status Amphibian and Aquatic Reptiles.)

Powerhouse and Appurtenant Facilities

FERC: *The total installed capacity of the powerhouse is 40.2 MW*. (SD1 at p. 9.)

KRB: This capacity is never achieved due to constraints in the water conveyance. The maximum operating capacity of the project is 36.8 MW. (See *supra*, § 1.1. Background.)

Gaging Stations

FERC: *SCE maintains two recording gaging stations that monitor and record water flow for project compliance.* (SD1 at p. 10.)

KRB: The public record of those gauges, published by USGS, includes daily average flow data but no instantaneous flow data required to evaluate compliance. (See *supra*, § 4.4.4.2. Gaging Stations.)

Project Recreation Site

FERC: *The site is on lands owned by SCE and accessible to rafting outfitters and the general public.* (SD1 at p. 10.)

KRB: Edison requires outfitters to maintain a permit for access to the site. (See *supra*, § 5.7.3. Recreation at the Project.)

3.1.2. Existing Project Operation

FERC: *Additionally, SCE provides 35 cfs year-round to California Department of Fish and Wildlife's Kern River Planting Base Hatchery via the project conveyance system and the powerhouse tailrace. SCE includes an additional buffer of 5 to 10 cfs in the hatchery flow to count for the diurnal flow fluctuations.*

KRB: FERC fails to note that the 35 cfs diversion takes precedence over the MIF requirements for the natural fishery below Fairview Dam. "Typically," FERC and USFS concluded in the 1996 EA, "we would recommend that the minimum flow or inflow,

whichever is less, be released." That is not the case here[150], and that decision needs to be re-evaluated for the health of the natural fishery and riparian ecosystem.[151] Further, Edison's "inclu[sion]" (appropriation) of a 5-10 cfs "buffer" on top of the first-in-line 35 cfs diversion is not authorized by the current license.[152]

3.5. Alternatives Considered But Eliminated From Detailed Study . . . .
3.5.2. Non-power License
FERC*: No party has sought a non-power license, and we have no basis for concluding that the Kern 3 Project should no longer be used to produce power.*
3.5.3. Project Decommissioning
FERC: *[T]he Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until . . . a participant in a relicensing proceeding demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative. SCE does not propose decommissioning, nor does the record to date demonstrate there are serious resource concerns that cannot be mitigated if the project is relicensed; as such, there is no reason, at this time, to include decommissioning as a reasonable alternative to be evaluated and studied as part of staff's NEPA analysis.* (SD1 at pp. 13-14.)
KRB: At this early stage in the ILP, there has not yet been a meaningful opportunity for parties or participants to provide a formal recommendation for a decommissioning study. FERC states there has been no data provided during the process to suggest such a recommendation; however, it has already received comments from multiple parties that do in fact suggest a decommissioning study is in order.[153] Project operations raise serious resource concerns that do not appear to be amenable to adequate mitigation.

KRB questions how FERC can fulfill its responsibility to consider nondevelopmental values in the absence of an environmental review of the protected river corridor without the project. For example, assessing the natural fishery's health under a without the project scenario would inform all alternatives that improve fish habitat and the riparian ecosystem and thus improve FERC's analysis of environmental measures. No living human being has ever enjoyed the natural flows of the watershed in the dewatered reach below Fairview Dam — except for when the project has been offline for repairs. The same can be said for the flora and fauna in the protected river corridor. Edison has signaled the project cannot support additional environmental or recreational mitigation that involves increased flows

[150] See *supra*, § 4.5.1. Water Management
[151] See *supra*, § 5.3.3. Aquatic Habitat
[152] See FERC Docket No. P-2290-120
[153] PAD Appendix (unpaginated) at .pdf pp. 31-123

below the diversion dam: it proposes none in its pre-application document[154], and its managers and consultants have repeatedly used the adjective "viable" when discussing the license it seeks — they want to secure a "viable license" to continue project operations. Yet mitigation involving additional flows for this protected river[155] is needed. Current minimum flows have been inadequate to secure a healthy fishery[156] or provide for enjoyable angling.[157] Current rec flows have provided a trifling benefit to recreation on this river that is protected for its outstanding recreational value.[158] The river flatlines at fish flow for two-thirds of the year (or more in dry years) because of operations; there is no natural variability.[159] There are unhealthy levels of bacteria and metalloids in the river.[160] The minimal fish flow regime results in an aesthetically displeasing visual experience: bare rockpiles, empty banks, narrow cascades, and slow or stagnant pool speeds.[161] The movement of millions of gallons of water a minute high above a state highway threatens life and property.[162] The project also occupies an energy landscape in which project contributions to the social good of energy generation are ever-declining and sometimes harmful given the rapid deployment of more environmentally friendly methods of generation.[163] Finally, KRB is presently approaching USFS with a proposal to apply for some of the $400 million available for dam removal in the 2021 Infrastructure Bill. Since the project resides almost entirely on lands managed by the Sequoia National Forest, USFS would logically be a candidate for continued supervision of remaining structures that have encumbered this protected corridor for 100 years. And since it appears Edison may not be able to accept a license with robust and equitable environmental and recreational restrictions on its current ability to divert water at Fairview Dam — it is already working hard to avoid such restrictions — a decommissioning option should be studied as a reasonable alternative under NEPA.

The requirement of a decommissioning fund should also be studied. Hydroprojects like this that encumber a protected river essential to Southern California should not continue operation just because the licensee cannot afford the costs of decommissioning. To

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[154] "SCE does not currently propose any new environmental measures." (SD1 at p. 12.)
[155] See *supra*, at § 5.7.7. National Wild and Scenic River System
[156] See *supra*, at §§ 3.7. Major Water Uses, 4.5.1. Water Management & 5.3.3. Aquatic Habitat
[157] See *supra*, at § 5.7.4.2. Angling and Swimming
[158] See *supra*, at § 5.7.4.1. Whitewater Boating
[159] See *supra*, at § 5.2.3.3. Hydrology
[160] See *supra*, at § 5.2.4.1. Water Quality Objectives from Basin Plan & 5.2.4.4. Additional Water Quality Parameters
[161] See *supra*, at § 5.9.3.1. Tulare County General Plan
[162] See *supra*, at § 5.10.6.3. Kern River No. 3 Hydroelectric Project Historic District
[163] See *supra*, at § 4.6. Other Project Information

the question of why Edison continues to operate this old project given its low output and high environmental cost, the most common response (beyond the obvious benefit to its employees and managers) is that Edison does not want to pay the price of restoration. That should not constitute a reason to continue operations. A decommissioning fund is the only way to remove this major unfunded liability from Edison's decision to continue project operations.

On the one hand, the project does not create an impoundment used by businesses, camps, or residences, nor does it supply drinking water, provide flood control benefits, support irrigation, or confer any additional public affordances. The power provided by the project has marginal and declining social utility. On the other hand, the project sits upon and dewaters a protected river corridor almost exclusively in public lands. It is a multiple agency objective to enhance the river corridor's visual quality, enhance the health of its natural fishery and riparian ecosystem, enhance the recreation opportunities provided by this outstanding public resource, and keep life and property safe. There is strong reason to believe these goals cannot be attained absent decommissioning. For these reasons, the NEPA analysis should consider decommissioning — a reasonable potential outcome to this proceeding whether through a non-power license or license denial.

In the alternative, as suggested above, FERC should include a "No Project Alternative" as an action alternative in its NEPA analysis so as to fully capture the project's effects on the protected river corridor and thus properly inform the scope of mitigation required.

IV • STUDY REQUESTS

KRB STUDY REQUEST 1: Aesthetic Flows

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to describe and evaluate the effects of project operations on aesthetic flows throughout the dewatered reach of the project — 16 miles of the Wild and Scenic North Fork Kern River — and to evaluate potential measures to alleviate those effects. This would be accomplished by evaluating the aesthetic benefit of various flows released into it from Fairview Dam. The objectives of this study are to:

(1) Document the existing aesthetic character and conditions of the dewatered reach;

(2) Identify key observation points;

(3) Collect photo and video documentation under various existing and controlled flow conditions throughout the reach;

(4) Conduct a focus group assessment of controlled flow conditions at key observation points;

(5) Determine the operational feasibility, effects on generation, and cost of providing aesthetic flow releases;

(6) Evaluate the potential effects of aesthetic flow releases on other resources including recreational uses, aquatic resources, water quality, and project generation.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with nondevelopment values, including aesthetic values, in its formation of hydropower licenses in a manner best adapted for the affected resource, its user groups, and the goals of existing management plans. The United States Forest Service is charged with establishing conditions in hydropower licenses that are necessary for the public's utilization and enjoyment of the affected resource, including aesthetic enjoyment.

The dewatered reach of the Wild and Scenic North Fork Kern River attracts vast members of the public throughout the year. It is the closest major perennial river to Southern California. It also has inherent outstanding values, and its visual values are to be

conserved and enhanced under the Wild and Scenic River Act.[164] It is unique in that the dewatered reach runs close to, and is frequently viewable from, the adjacent state highway, Mountain 99. More of it is viewable from the many popular campgrounds, developed and primitive, directly next to the river. Aesthetic changes have the potential to affect public use and enjoyment of the dewatered reach. To fully evaluate the project's effect on aesthetic flows over within the dewatered reach, and to balance potential enhancement opportunities with their costs, a controlled-flow aesthetic study is relevant to the public interest.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.
The PAD generally describes the visual characteristics of project facilities and surrounding project lands.[165] However, it does not describe the relationship between decreased flows and aesthetics in the dewatered reach, nor does it cite any studies that characterize or evaluate that relationship. Information on the aesthetic conditions collected during this study would inform a decision on whether additional minimum releases from the project's diversion would be warranted to improve the aesthetic quality of the dewatered reach. In the last proceeding, USFS noted that some commenters requested increased minimum flows for "visual quality," but averred, "This topic was brought out when the licensing process was nearing completion and too late to address this licensing."[166] It is ripe to be addressed at this early stage.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.
Project operations leave only 40-130 cfs, or less, in the dewatered reach when incoming flows are below 640-770 cfs and decreases all incoming flows above 640 and 770 cfs by 600 cfs. The results of this study would provide a separate, independent vector of analysis for a minimum flow regime, and it could be compared agency goals on issues such as environmentally required minimum flows, angler-enjoyable fish flows, water quality flows, and enjoyable recreational flows.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted

[164] USFS CMP WSKR (nd) at p. 45
[165] PAD at pp. 5-158 through 5-170
[166] USFS NOD FONSI (1998) at Appendix E, p. 8

practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The aesthetic flow study should follow the methods outlined in *Flows and Aesthetics: A Guideline to Concepts and Methods* (Whittaker 2017). These guidelines recommend a progressive approach with phased efforts of increasing resolution.

Phase 1 (desktop analysis and reconnaissance assessment) includes the characterization and documentation of key viewing locations and key viewing characteristics (i.e., waterfalls, vegetation, distance, etc.) in the dewatered reach. Potential use and access to these key viewing locations would be studied. From the information gathered during Phase 1, a controlled flow evaluation form would be created. In Phase 2 (documentation and assessment of controlled flow releases), Edison would tailor its diversion to release target flows selected in consultation with a focus group that would evaluate the flows. The 2017 guidelines provide considerations and recommendations on how to best identify key observation points, collaborate with the public, and conduct surveys, among other study components.

Desktop Analysis and Reconnaissance Assessment (Phase 1)

Focus Group

A focus group composed of interested stakeholders should be assembled to provide assistance and input. These stakeholders should include representative members from the public, not just from the Kern River Valley, but from its primary visitor base of Southern California, from Bakersfield, out to Ventura County, down through Los Angeles, Riverside and Orange counties, and concluding in San Diego. The focus group members should allow for collaboration and agreement on multiple decision points regarding the development of the study.

Key Observation Points

In consultation with the focus group, identify key observation points to represent important landscape perspectives and viewing opportunities of the dewatered reach. Key observation points should include at least some of the following sites with extended roadside visuals and turnouts, from North to South (identified by corresponding rapid name): Bomb's Away, Fairview, Hairy Ferry, Boateater, Passing Lane, Redrock, Squashed Paddler, Golf Course, and Fender Bender. KOP's should also include views from at least some of the developed (*e.g.,* Fairview, Goldledge, Camp 3) and primitive (*e.g.*, Chamise, Springhill, Chico Flat) campsites. The assessment should include identification of key viewing characteristics (*e.g.,* channels, key features/structures, waterfalls, pools) and characterization of potential use and access of these areas.

Historic Data Gathering

Assess and characterize the timing and flow ranges of historic flow exceedance events to characterize existing flow conditions as they relate to the aesthetic character of the dewatered reach.

Documentation and Assessment of Controlled Flow Release (Phase 2)

Controlled Flow Conditions and Evaluation Form

With the assistance of the focus group, determine the number of releases and appropriate aesthetic flow levels for conducting a review/evaluation of identified flows from the key observation points. An explanation of the targeted aesthetic flows should be included in a study progress report provided to the Commission and interested stakeholders. A broad range of flows would allow evaluators to conduct a meaningful evaluation and identify a minimum acceptable flow and an optimal aesthetic flow. At least four flows should be evaluated as part of the flow study: current minimum fish flows, and additional low, moderate, and high flows.

A numeric rating evaluation form of the overall view and specific elements (*e.g.,* sound level, amount of turbulence) should be developed. The form should include questions pertaining to the evaluation of the aesthetic conditions for each key observation point location under the targeted flow ranges.

Controlled Flow Assessment

The focus group should review the flows on-site at the key observation points, complete the evaluation form, and participate in a focus group discussion (off-site). Photo and video (with sound), documentation of the observed flows reviewed by the focus group should be documented.

Data Analysis and Report Preparation

The operating consultant should prepare a report that includes discussion of the study methodology, study area, analysis and results of the Aesthetic Flow Study. The report should document the information compiled from the above efforts, including analysis and summary of the focus group evaluation form responses and discussions. The report should also include an assessment of potential effects of providing aesthetic flows on other resources, such as recreation opportunities, aquatic resources, and project power generation. Comments and criticisms of the analysis should be incorporated into the report as an appendix.

The proposed aesthetic study follows methods outlined in *Flows and Aesthetics: A Guideline to Concepts and Methods* (Whittaker 2017). Therefore, these methods are consistent with generally accepted methods for conducting an aesthetic flow study.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The anticipated cost for the aesthetic flow study request is estimated to be approximately within the range of $40,000 to $60,000.

KRB STUDY REQUEST 2: Water Quality Flows

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

This study would describe and evaluate the effects of project operations on water quality throughout the dewatered reach of the project — 16 miles of the Wild and Scenic North Fork Kern River — and to evaluate potential measures to alleviate those effects. This would be accomplished by evaluating the benefit to water quality in the dewatered reach afforded by various flows released into it from Fairview Dam. The objectives of this study are to: (1) Document the existing water quality conditions of the dewatered reach; (2) Identify whether additional flows could improve those conditions; and (3) Evaluate the potential effects of water quality flow releases on other resources including recreational uses, aquatic resources, aesthetics, and project generation.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with nondevelopment values, including water quality values, in its formation of hydropower licenses in a manner best adapted for the affected resource, its user groups, and the goals of existing management plans. The United States Forest Service is charged with establishing conditions in hydropower licenses that are necessary for the public's utilization and enjoyment of the affected resource, including water quality.

The results of this study may further inform the managing agencies' goals by providing a separate, independent vector of analysis whose results might dovetail with agency recommendations, findings, or prescriptions on issues such as ecologically required flows, aesthetic flows, angler-enjoyable fish flows, and whitewater recreational flows.

The dewatered reach of the Wild and Scenic North Fork Kern River attracts vast members of the public throughout the year. It is the closest major perennial river to Southern California, and attracts vast numbers of visitors for camping, hiking, fishing, whitewater, and other forms of recreation throughout the year. It also has inherent outstanding values, and its water quality is to be conserved and enhanced under the Wild and Scenic River Act.[167] Water quality has the potential to affect public use and enjoyment of the dewatered reach, as well as public health. To fully evaluate the project's effect on

[167] USFS CMP WSKR (nd) at pp. 46-47

water quality within the dewatered reach, and to balance potential enhancement opportunities with their costs, a controlled-flow water quality study is relevant to the public interest.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The PAD generally describes what is known about the water quality of the dewatered reach — primarily from studies conducted decades ago.[168] Specific to this study request, the PAD acknowledges that levels of (1) coliform bacteria and (2) arsenic have been measured at elevated levels.[169] Further, in 1995, USFS, NPS, and CDFW concluded there was an "environmental concern" about coliform bacteria levels in the dewatered reach.[170] Human usage of the campsites next to the river has only increased since then. The PAD does not describe the relationship between flows and these two particular water quality issues in the dewatered reach, nor does it cite any studies that characterize or evaluate that relationship. USFS has noted, "High coliform bacteria counts may be responsible for instances of low DO."[171] In the last proceeding, the California State Water Resources Control Board "increased fecal coliform levels and potential solutions to the problem were flow-related."[172] The Environmental Assessment concluded, "Flows in the bypassed reach can influence bacteria counts through dilution."[173] Information on the water quality conditions collected during this study would inform a decision on whether additional releases from the project's diversion dam would be warranted to improve the water quality of the dewatered reach. Even if they are always not successful at all times, additional flows are a tool managing agencies can use to address the problem.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The project presently takes the first 40-45 cfs of incoming flows at the Fairview diversion dam for minimum power generation, and then, after the seasonally varying minimum instream flow requirement is satisfied, takes the next 600 cfs. These conditions leave only 40-130 cfs, or less, in the dewatered reach when incoming flows are below 640 and 770 cfs, and decreases all incoming flows above 640 and 770 cfs by 600 cfs.

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[168] PAD at pp. 5-38 through 5-48
[169] PAD at pp. 5-39, 5-48 & 5-49
[170] 1995 USFS UKB Plan at p. V-3
[171] 1998 USFS NOD FONSI at Appendix E, p. 13
[172] 1996 EA at p. 26
[173] *Ibid.*

The PAD avers that project operations are not a source of coliform bacteria or arsenic, and that human activity accounts for the former and an unknown source below Fairview Dam accounts for the latter.[174] However, the PAD also concedes that project operations "influence coliform counts."[175] Even if the source of elevated coliform or arsenic levels is not the project itself and lies below the project's diversion dam, the quantity of water diverted by the project may play a direct role in influencing the concentration levels of those substances. As our Supreme Court has observed, "water quantity is closely related to water quality."[176] Increases in the amount of water flowing may dilute the concentration of a harmful or contaminant substance, as Edison has conceded elsewhere.[177] And again, the 1996 EA concluded that "Flows in the bypassed reach can influence bacteria counts through dilution."[178] This effect is especially likely where the source of the contaminant is within the project affected area, and varying currents, eddies, and rapids have the potential to mix more heavily concentrated waters near the source(s) with less heavily concentrated waters. It is also true that the 1996 KR3 EA found that dilution could not satisfy EPA standards "at all times." However, the current managing agencies may find that to be the perfect getting in the way of the good; further dilution may meaningfully contribute to the health of the river and its users at many more times than current conditions allow. Further, human activity along the dewatered reach has increased since the prior proceeding, and that may make remedial measures from the flows this resource is capable of delivering worthwhile. Finally, the SWRCB did not propose dilution in the last proceeding; it may in this one.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The study should proceed in three phases. It should first employ a desktop analysis to determine what sites in the dewatered reach, at what times of year and at what flow levels are most likely to return elevated test results for bacterial or metalloid concentrations, given EPA and SWRCB guidance on acceptable contaminant levels. The results of the desktop study should then inform when and where to test for those concentrations. Finally, if elevated levels are discovered, a controlled flow study should

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[174] PAD at pp. 5-48 & 5-49
[175] Pad at p. 5-39
[176] *PUD No. 1 v. Wash. Dep't of Ecology,* 511 U.S. 700, 719-720 (1994)
[177] FERC eLibrary No. 20210607-5005 at p. 3-322
[178] 1996 FERC-USFS EA at p. 26

promptly follow an elevated test level with two or three increased flow levels to determine if bacterial or metalloid concentrations can be decreased therefrom. This request does not constitute a formal study proposal, and KRB is confident that the Commission, other managing agencies, and consultants could incorporate a bacterial and chemical study into the currently proposed study plans. If not, it may be 70 years (30 years for the last license, the default of 40 for the present application) between bacterial and metalloid studies on this protected river.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost should be low to moderate. The requested study, as noted, can be to a significant extent incorporated into proposed studies, and the controlled flow portion of the study, if needed, would not amount to an out-of-pocket cost to Edison; it would be lost generation opportunity in service of designing a license for vastly more generation that is adapted to the affected resource and its affected users.

KRB STUDY REQUEST 3: Enjoyable Angling Flows

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to evaluate the effect that project operations have on angler enjoyment of fishing in the 16-mile dewatered reach below Fairview Dam. The amount of water present in a fishery can significantly impact an angler's enjoyment of a fishing outing. This proposal focuses on situations where Edison's diversion of water from the North Fork Kern may leave a quantity of water in the riverbed that is so low as to render an angling outing for a typical person less than enjoyable.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Federal Energy Regulatory Commission seeks to give equal consideration in this proceeding to the public good of recreation as it gives to the social utility of generation. The Commission cannot afford equal consideration of without fully capturing and evaluating the losses generation causes to recreation. One of those losses for anglers may be inadequate flows for enjoyable fishing in the dewatered reach.

The United States Forest Service seeks to establish those conditions in the proposed license required for the enjoyment of public lands. USFS cannot understand what is required with regards to fishing recreation on the North Fork Kern without understanding when flows are too low for a quality fishing experience.

The North Fork Kern is popular as a fishery. If anglers are avoiding the dewatered reach of that river for lack of water when running at minimum instream flow levels, the public interest is being injured by the project. Properly establishing the flow level at which angler enjoyment decreases can enable managing agencies to mitigate the injury.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

Edison does not describe the quality of angling experiences at minimum instream flow levels. A long-established blog by Mr. Arner of the Kern River Fly Fishing Club indicates that flows below 100 cfs are not enjoyable to fish in the dewatered reach.[179]

[179] See *supra*, at § 5.7.4.2. Angling and Swimming

There has not been an "angler study" consistent with the contemporary methodology established by Whittaker, *et al.*, *Flows and Recreation: A Guide to Studies for River Professionals* (2005). The need for one is demonstrated by Mr. Angler's blog and comments to the managing agencies that minimum flows are too low in the dewatered reach.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

After accounting for minimum instream flows between 40 cfs (four months) and 130 cfs (two months), the Kern River No. 3 hydroproject is authorized to divert the next 605 cfs from the riverbed. Over the POR for this license, the average daily flow above Fairview Dam fell below 100 cfs just 151 days out of 8,766 — about 1.7% of the time. During the same period, the average daily flow in the dewatered reach below the dam fell short of 100 cfs on 2,790 days — about 31.8% of the time.

The requested study would inform the questions of when flows are too low for an enjoyable angling experience and what level of enjoyment exists at different flow levels, thus helping managing agencies understand the full extent of project effects and provide them a basis upon which to gauge mitigation project effects with updated minimum instream flow requirements. The results may also dovetail with information about aesthetically pleasing minimum flows, environmentally sound minimum flows for riparian habitat, water quality minimum flows, and other vectors indicating that the current MIF regime should be reformulated.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Basic Methodology: Desktop studies to the extent feasible, followed by on-water, controlled flow studies. The quality of angling experiences should be studied at no less than four incremental levels of flow below Fairview Dam: 100, 150, 200 & 300 cfs. The study should employ anglers with varying levels of skill, technique, and expertise. Study participants should rate their experiences at different flow levels to evaluate how future project operations can better meet public recreation needs. Details on methodology would be consistent with Whittaker (2005).

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The level and effort of cost is commensurate with the protected status of the North Fork Kern and the public interest in it as a source of angling. Only an evaluation of minimum flow scenarios *in situ* can effectively determine whether large inventories of angling days are lost to project operations. The cost is justified by the statutory duty of the managing agencies to balance and adapt the proposed license to mitigate the effects of the project on this outstanding recreational public resource.

KRB STUDY REQUEST 4: Conveyance, Forebay, and Penstock Safety

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to describe and evaluate the potential safety risks of project operations to life, property, and infrastructure in the area that lies below the penstocks, forebay, and elevated conveyance near the powerhouse of the project, and to evaluate potential measures to prevent or minimize those risks. The study would be accomplished by an independent engineering firm.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by statute to ensure its licensed projects do not threaten persons and property. Project safety is a top priority of all managing agencies. The Wild and Scenic North Fork Kern River attracts vast members of the public throughout the year. It is the closest major perennial river to Southern California. It is served by Highway 99, a state highway that parallels that river and passes beneath the project's penstocks, forebay, and the final elevated portion of its conveyance about two miles north of the town of Kernville. To fully evaluate the risks these assets pose to the public interest — life, property, and infrastructure — as well as to mitigate those risks, an independent engineering study is in order.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The PAD does not use the word "risk" or "safety" in reference to the project's penstocks, forebay, or final elevated conveyance. The PAD does not characterize or consider any risk to public interests posed by those assets.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The project diverts 600 cfs at Fairview Dam and supplemental flows at Salmon and Corral creeks. (PAD at pp. 4-5 & 4-6.) The "maximum conduit limit" is 620 cfs.[180] That

[180] See *supra*, at § 1.1. Background

amounts to 278,256 gallons or 2,309,524 pounds of water passing through project assets per minute. (One cubic foot amounts to 7.48 gallons, and one gallon of water weighs 8.3 pounds.) The forebay sits 821 feet above the powerhouse. (PAD at p. 5-213.) If there were a catastrophic failure of these elevated assets not confined to the spillway, the project would deluge the hillside as well as Mountain 99 and any traffic thereon below. This study would inform the license's provision of project safety conditions.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The study would involve desktop methods and a site visit, if needed. The study should examine the threat posed by the project through the lens of the catastrophic failure that occurred at KR3's sister project — Kern River No. 1 (FERC Project No. P-1930, "KR1") — on August 19, 2013.[181] That day, a summer storm set loose water and debris that penetrated the project's conveyance and clogged its penstocks and emergency spillway. Water crested the forebay and deluged the mountainside below, "severely" eroding it (FERC 2013) and causing a landslide that closed Highway 178 — the Kern River Valley's primary artery — in both directions for ten days. (Henry 2014.) The project continued diverting water to the forebay throughout the event. As a result of this incident, the Commission increased the hazard rating for the project from "low" to "significant." (FERC 2014.)

The risks inherent in KR3 should be studied through the lens of the KR1 incident because many of the same risk factors apply. Like KR1, KR3 conveys a large volume of moving water (again, 2,309,524 pounds per minute) at elevated levels above a highway. Mountain 99 is not travelled as much as Highway 178, but that would not matter to vehicles and passengers who happened to be on it during catastrophic landslide. Moreover, KR3 conveys 50% more water than KR1.[182] Finally, the elevated assets of KR3 at issue are less than two miles from a major fault.[183] FERC and its projects have commissioned independent engineering studies of risk in the past, and one is in order for this project.

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[181] See *supra*, at Figure 61: Kern River No. 1 Landslide

[182] PAD at p. 3-7

[183] See: https://pubs.geoscienceworld.org/gsa/geosphere/article/8/3/581/132511/Map-of-the-late-Quaternary-active-Kern-Canyon-and

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost for an independent engineering study should be moderate-low to moderate. Again, desktop methods and a site visit should suffice upon the receipt of technical descriptions of the elevated assets from Edison.

References

FERC eLibrary Nos. 20131007-0307, 20131104-5010 & 20140325-0159.

Lois Henry, "Mother Nature got help shutting down Hwy 178," Bakersfield Californian, March 29, 2014, reprinted below:

> Mother Nature may have gotten a bad rap on those landslides that closed Highway 178 during the height of tourist season last August.
>
> A tremendous storm whipped through eastern Kern County and dropped heavy rains in the Kern River Canyon the night of August 19.
>
> Rock, mud and debris skittered down the canyon walls and closed the highway in at least two places near the Southern California Edison power plant a few miles east of the mouth of the canyon.
>
> It took Caltrans 10 days to get the road fully open again, at a cost of more than $500,000.
>
> In January, Caltrans sent Edison a bill for the full cost of the clean up.
>
> Whaaaaat?
>
> Yes, as it turns out, Caltrans believes the Edison power plant facilities were the cause of the slides.
>
> Not so, Edison spokesman Paul Klein said.
>
> "We would not characterize this as Edison being at fault," he said. "This was a weather event."
>
> Not surprisingly, the Caltrans bill has gone unpaid.
>
> Klein said he couldn't comment on the status of the bill because he hadn't had time to research exactly where it was in Edison's system.
>
> The power plant was shut down after the incident and only recently came back online in late February. Edison is still working to repair damage from the storm to its facilities and it's only yet in the consultation stage with the U.S. Forest Service to come up with a plan to stabilize the badly eroded hillside.
>
> While there has been no independent investigation of the landslides, a letter from the Federal Energy Regulatory Commission (FERC) sent to Edison earlier this month clearly pins the cause of at least one of the two slides on faulty Edison facilities, specifically a retaining wall.
>
> The commission has ordered Edison to file a lengthy report on how it will prevent a similar failure in the future. The letter also changed the hazard

rating of the project from “low” to “significant,” which will mean increased inspections by FERC.

A low rating means a project would have essentially no impact were it to fail. Significant means it might have impacts to structures or some environmental impact. A rating of “high” indicates a probable loss of life should the project fail.

I’m not sure why the project wasn’t pegged at “high” since it was just pure luck that no one was driving on 178 when the landslides happened. But no one asked me.

At this point, many of you are probably wondering how a powerhouse in the river could be the cause of a landslide from hundreds of feet above.

It’s pretty interesting actually.

The powerhouse, known as Kern River 1 (KR1), isn’t fed by the natural flow of the river.

The water that makes the power comes from behind Democrat Dam, 14 miles upriver from KR1.

Water from Democrat travels by tunnel and flume high along the south canyon wall to a “forebay” (essentially a regulating station) above KR1. From there, the water drops by pipeline down to the powerhouse where it spins the turbines and gets dumped back into the river.

The whole system is gravity fed, no pumping. And, by the by, it was all constructed back in 1906 (they didn’t even have an app for that back then!). Fascinating.

Anyhow, on the night of August 19 the heavy rains created flash floods that charged down the sides of the canyon.

There’s an access opening that’s used to get into the KR1 tunnel for maintenance a few hundred yards east of the forebay.

A landslide crashed through a retaining wall above the access point and busted it open before continuing down to cover Highway 178.

Water, rocks, mud and plant material rushed into the access opening and was carried to the forebay.

There is an emergency spill pipeline at the forebay that should have moved that flood water and debris safely down to the river. But the opening was covered by a grate that became plugged.

The forebay was inundated.

Water overtopped the structure and eroded a huge chunk of the hillside, which came crashing down onto 178.

The forebay does have monitoring sensors and Edison workers were alerted, but no one could get to the structure as the highway was blocked even further

up from the powerhouse, according to Danielle Chupa, Edison's Eastern Hydro Division chief.

"This was purely a Mother Nature situation," she said.

Well, not entirely.

In a letter to FERC dated Nov. 1, 2013, Edison states the retaining wall above the access opening (which it described as a "kneewall," which is typically very short, under three feet) will be replaced by a wedge-shaped concrete wall to deflect water and debris around the access opening.

Oh, and having a grate over the mouth of the emergency spill pipeline probably wasn't a good idea either and will be corrected, Edison also notes in its Nov. 1 letter.

In its March 12, 2014, letter back to Edison, FERC sums up that: "The cause of the overflow incident is the failure of the retaining wall …" above the access opening, which set everything else in motion.

Mother Nature may have started the ball rolling, but Edison's facilities clearly helped her out.

Now, about that $500k …

Opinions expressed in this column are those of Lois Henry, not The Bakersfield Californian. Her column appears Wednesdays and Sundays. Comment at http://www.bakersfield.com, call her at 395-7373 or e-mail lhenry@bakersfield.com

KRB STUDY REQUEST 5: Flow Travel Times

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to evaluate the amounts of time certain flows take to travel from the project's diversion point to its powerhouse, both through its conveyance and through the dewatered reach, the results of which may constrain or afford opportunities for plausible environmental or recreational mitigation measures.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with nondevelopment values, including recreational and environmental values, in its formation of hydropower licenses in a manner best adapted for the affected resource, its user groups, and the goals of existing management plans. The United States Forest Service is charged with establishing conditions in hydropower licenses that are necessary for the public's utilization and enjoyment of the affected resource, including water quality. The results of this study may further the managing agencies' goals by providing solid data about constraints and opportunities the project's configuration affords for environmental and recreational mitigation. For instance, recreational flow releases, which lower the ability of the project to generate power, may be able to be coordinated in substantial respect with predictable times of day, days of the week, or months in the year when energy markets are likely to signal low or negative needs for marginal power. Such coordination will require information about how long it takes for the water to travel the conveyance (to evaluate at what time changes in the diversion affect the timing of the project's power production) and the dewatered reach (to evaluate the recreational opportunities afforded by changes in the diversion).

The dewatered reach of the Wild and Scenic North Fork Kern River attracts vast members of the public throughout the year. It is the closest major perennial river to Southern California, and attracts significant numbers of visitors for camping, hiking, fishing, whitewater, and other forms of recreation throughout the year. It also has inherently outstanding recreational values that are to be conserved and enhanced under governing management plans.[184] The amount of time flows take to reach the powerhouse

[184] USFS CMP WSKR (nd) at pp. 46-47

through the project's conveyance and through the dewatered reach may constrain or afford opportunities for conservation and enhancement mitigation in the public interest. Since the managing agencies are charged with mitigating the project's effects in balance with society's need for power, it is important to know if and when there are opportunities for the mitigation of those effects that coincide with times society has a relatively low need for power. A controlled-flow timing study would accordingly serve the public interest in designing a license that best serves this public resource.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The PAD does not describe the amount of time flows or flow changes at the diversion take to arrive at the project powerhouse by either its relatively direct concrete conveyance or the relatively meandering natural riverbed it affects.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The project presently takes the first 40-45 cfs of incoming flows at the Fairview diversion dam for minimum power generation, and then, after the seasonally varying minimum instream flow requirement is satisfied, takes the next 600 cfs. These conditions leave only 40-130 cfs, or less, in the dewatered reach when incoming flows are below 640 and 770 cfs, and decreases all incoming flows above 640 and 770 cfs by 600 cfs. The project accordingly has a major effects on recreation in the dewatered reach throughout the year. The proposed controlled-flow timing study would be used to develop timing requirements of recreational or ecological releases to as part of the license requirements.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The study would involve flow gauges at the diversion point and timed releases of several different quantities of water. Two different sets of timings need to be collected: 1) time required for water to move through its conveyance until it reaches the powerhouse, and 2) time required for water to move through the dewatered reach of the NF Kern.

Part 1: Time required in conveyance

Sensors do already exist at "the penstocks [which] are equipped with electronic flowmeters for the determination of the amount of waterflow" (SCE, 1991). Where not already present,

flow gauges should be placed at the diversion point at Fairview dam, at the generators or penstock valves. Using these sensors, change the diversion from 0 cfs to each flow volume as specified (and according to ramping maximum constraints), and record the time required for the specified flow to reach the point of power generation. Optionally, also record the power generated itself (MW) and measure time required to corresponding power generation if there are any further time delays or requirements.

Flow volume (cfs)	Time required for water passage through conveyance from diversion point to power generation point (minutes)	Time required from water diversion to power generation (minutes)
100		
200		
300		
400		
500		
600		

Part 2: Time required in river channel

Where not already present, flow gauges should be placed at the diversion point at Fairview dam, and in NF Kern River at the Powerhouse above the powerhouse discharge to capture the flows in the river at that point. Using these sensors, change the diversion to release each flow volume specified into the river channel, and record the time required for the specified flow to reach the Powerhouse via the river channel. Since these times will differ based on how much water is in the river, evaluate the speed at various incoming flow levels.

	Time required for water passage through river channel from diversion point to Powerhouse (minutes)			
Flow volume released (cfs)	Incoming flow above Fairview is 100 cfs	Incoming flow above Fairview is 500 cfs	Incoming flow above Fairview is 1000 cfs	Incoming flow above Fairview is 1500 cfs
100				
200				
300				
400				
500				
600				

Where data is already recorded and available, it could be provided in lieu of re-measurement. Report and share all results with stakeholders.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost for an internal or independent engineering study should be low to moderate-low based on the use and recording of several gauges. The controlled flow portion of the study would not amount to an out of pocket cost to Edison; it would be lost generation opportunity in service of designing a license for vastly more generation (40 years of such) that is best adapted to the affected resource and its users.

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SCE. (1991) Kern River No. 3 Water Power Project (FERC Project No. 2290) Application for New License for Major Project – Existing Dam. Volume 1 of 5: Initial Statement; Exhibits A, B, C, D, F, G, H; and Appendices. United States of America Before the Federal Energy Regulatory Commission. December 1991.

SCE. (2021) Southern California Edison Kern River No. 3 Hydroelectric Project (FERC Project No. 2290), Pre- Application Document. Volume 1. September 2021.

KRB STUDY REQUEST 6: Tunnel Maintenance Flow

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to evaluate the effect that increasing and decreasing the quantity of water diverted at Fairview Dam — and thereby, increasing or decreasing the quantity of water conveyed through the project's tunnels — for purposes of whitewater mitigation has over and above the baseline rate of damage incurred by the tunnel liner due to naturally occurring variations in tunnel flow (annual, seasonal, and daily diurnal) and the nature of the material used to line the tunnel walls — namely, concrete — the results of which may constrain or afford opportunities for recreational mitigation measures.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with nondevelopment values, including recreational and environmental values, in its formation of hydropower licenses in a manner best adapted for the affected resource, its user groups, and the goals of existing management plans. The United States Forest Service is charged with establishing conditions in hydropower licenses that are necessary for the public's utilization and enjoyment of the affected resource, including whitewater recreation. The results of this study may further the managing agencies' goals by providing solid data about constraints and opportunities the project's configuration affords for recreational mitigation. At present, as the result of a settlement between Edison and American Whitewater, recreational mitigation is capped at a maximum of 300 cfs. This study seeks to determine whether there is a scientific basis for that cap.

The dewatered reach of the Wild and Scenic North Fork Kern River attracts vast members of the public throughout the year. It is the closest major perennial river to Southern California and is Southern California's primary resource for whitewater recreation of all kinds — whether by paddle raft, oar raft, open canoe, splashyak, shredder, hardshell kayak, stand up paddleboard, riverboard, or innertube. The dewatered stretch has inherently outstanding recreational values that are to be conserved and enhanced under governing management plans.[185] Whether recreational mitigation should be capped at 300 cfs because of project effects rather than provided in some greater amount (up to 600 cfs) is

[185] USFS CMP WSKR (nd) at pp. 46-47

a pressing issue for both the managing agencies and the public, and it is one that should be informed by science, not assertions. A study into whether the effects of tunnel watering and dewatering merit capping recreational mitigation at 300 cfs or whether those effects are more marginal than Edison asserts, providing for increased mitigation, would accordingly serve the public interest in designing a license best adapted to this public resource.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The current rec flow schedule limits the benefit of a recreational release (rec day) for whitewater boating to 300 additional cfs, maximum, out of the 600 cfs Edison diverts from incoming flows at Fairview Dam. The rationale for this limitation was founded upon a purported "SCE study" that showed "the removal of water from the [KR3 diversion's conveyance] tunnel for whitewater boating on a regular basis will create greater and more frequent damage to the tunnel liner."[186]

From the earliest stage in this relicensing proceeding — namely, the initial questionnaires sent out by Edison in September 2019 — stakeholders have asked to see this study. Stakeholders — including stakeholders who have already been qualified by FERC to view CEII — continued asking to see this study throughout the TWG meetings. John Gangemi, who was American Whitewater's signatory to the 2002 Settlement, said in his role as consultant for Edison in the current proceeding that he could not recall ever seeing this study.[187] Current AW lead Theresa Simsiman has looked for the study in AW's records and could not find it and has never seen it.[188] At the December 09, 2020 TWG meeting, David Moore said Edison would look for the study. At the April 29, 2021 TWG meeting, Moore said Edison could not find and did not have this study. So there is no evidence in the FERC record or elsewhere that any person outside of SCE has ever seen this study. Nor is there evidence that any current SCE employee has ever seen it.

The study's conclusion that 300 cfs is required to remain in the tunnel during rec days to prevent damage is controversial. Why is the required level 300 cfs instead of 250, or 200, or 100, or 50? Absent an evidentiary basis, the 300 figure appears to the public to be conveniently arbitrary: it amounts to 50% of the flow KR3 is able to divert. Further, there were no whitewater rec flows prior to the study; that's why SCE did not say that removing water from the tunnel "has" created damage, but instead "will" create damage. There does not appear to be evidence that removing more than 300 cfs from the tunnels would cause damage at a greater rate than occurs during normal operations, which involve tens of thousands of natural fluctuations during the term of a

[186] 2002 Whitewater Settlement, Rationale at p. 2.
[187] 09DEC2020 TWG meeting
[188] 01DEC2021 AW meeting

license. Nor is there any evidence available to the public that removing water from the tunnel would damage the tunnel to a greater extent than naturally occurring fluctuations. On that note, natural diurnal fluctuations during occur every day during the spring and early summer runoff, and many of those fluctuations are significant. Edison does not choose to keep its diversion at steady, predictable levels during these times; it takes all the water it can get — fluctuations or not — and repairs the tunnels as a cost of doing business. There is also no evidence that liner damage isn't simply in the nature of transporting water over concrete. This proposed study seeks to take the place of the never-seen, missing, and self-serving Edison study that animates the current 300 cfs mitigation cap. Finally, Edison indicates in the PAD that water does not crest the tunnel liner: "The tunnel segments [are] 8 feet high. . . . Water flow in the tunnel does not achieve a depth of greater than 7.5 feet, making lining of the arched ceiling unnecessary."[189] Edison also spent 16 months rehabilitating the tunnel liner in 2013-2014 to "improve" its integrity.[190] These facts call into question (1) whether the original tunnel maintenance study continues to apply and (2) whether Edison had the opportunity to modernize the tunnel liner, but chose not to.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The project presently takes the first 40-45 cfs of incoming flows at the Fairview diversion dam for minimum power generation, and then, after the seasonally varying minimum instream flow requirement is satisfied, takes the next 600 cfs. These conditions leave only 40-130 cfs or less in the dewatered reach when incoming flows are below 640 and 770 cfs, and decreases all incoming flows above 640 and 770 cfs by 600 cfs. The project accordingly has a major effects on recreation in the dewatered reach throughout the year. The results of this study will help to define the limits of project operation in order to inform a more equitable management plan in the license.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

An independent engineering firm would be asked to evaluate:

(1) the "natural" rate of damage expected to be incurred by the project's tunnel liners as it conveys water through the

[189] PAD at p. 4-7

[190] See *supra*, § 4.4.2.2. Tunnels, Flumes, and Adits

project, given (a) the tunnel's physical configuration and (b) naturally varying flows (operational flow analysis of hourly historical variances);
(2) the "current" rate of damage expected to be incurred by the former plus the current rec flow schedule;
(3) the "future" rate of damage expected to be incurred by the natural rate plus a variety of potential rec flow schedules featuring additional numbers of days per year (*e.g.*, 30, 50, 70) and quantities of water (*e.g.*, 400, 500, and 600 cfs);
(4) the effect that alternate tunnel configurations (different sealants, concrete formulations, or types of liner material) would have on these rates of damage.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost for an independent engineering study should be moderate to moderate-high based on the engagement of a reputable independent engineering firm and the provision of various desktop tools (project descriptions and hydrology) for scientifically defensible models of the effects studied. The cost is justified by the statutory duty of the managing agencies to balance and adapt the proposed license to mitigate the effects of the project on this outstanding recreational public resource that constitutes Southern California's most important river.

KRB STUDY REQUEST 7: Environmental Flows

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to apply the California Environmental Flows Framework (CEFF)(CEFWG, 2021) to the Wild and Scenic North Fork Kern River in order to provide environmental flow assessment and environmental flow recommendations. The objectives of this study are to:

(1) Identify the ecological flow criteria using natural functional flows for the NF Kern River. Determine the natural ranges of the flow metrics for each of the five functional flow components (fall pulse flow, wet-season base flow, wet-season peak flows, spring recession flow, dry-season base flow);

(2) Develop any additional ecological flow criteria for each flow component requiring additional consideration (e.g. additional constraints imposed by water temperature, dissolved oxygen concentration limits, and fish habitation requirements);

(3) Develop environmental flow recommendations which reconcile the ecological flow needs with the non-ecological hydropower management objectives to create a balanced environmental flow recommendation.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with "the protection, mitigation of damage to, and enhancement of, fish and wildlife ..., and other aspects of environmental quality" in its formation of hydropower licenses. The California Department of Fish and Wildlife (CDFW) is the relevant State fish and wildlife agency for resource consultation pursuant to the Federal Power Act Section 10(j).[191] CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of those species.[192] Information generated through this study will further inform the managing agencies' goals by providing a modern, state of the art science-based flow assessment and recommendation that balance ecosystem and human needs for water.

[191] 16 U.S.C. § 803(j)

[192] Fish & Game Code § 1802

The dewatered reach of the Wild and Scenic North Fork Kern River attracts vast members of the public throughout the year. It is the closest major perennial river to Southern California. It also has inherent outstanding values, and its environmental values (ecological, fish, and wildlife assets) are to be conserved and enhanced under the Wild and Scenic River Act. Flows have been diverted for hydropower on the NF Kern since 1921 when the Kern River No. 3 ("KR3") project first went online, and diversion has continued in similar manner for the subsequent 100 years. Over those 100 years, the science of ecology, hydrology, and environmental protection has evolved significantly. In support of those ecological, fish, and wildlife assets, it is in the interest of the public to review the long-standing ecological impact on the NF Kern, and define a modern, scientifically-based and environmental sound means of balancing resource allocation and preserving the ecological health of one of Southern California's premiere rivers.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The PAD proposes individual studies on elements of the entire affected Kern River ecosystem: water temperature and dissolved oxygen (WR-1), inventorying of foothill yellow-legged frogs (BIO-1), western pond turtles and special-status salamanders (BIO-2), and general wildlife and botanical resources (BIO-3 and BOT-1). However, there is no attempt to define the long-term ecological impacts from drastically reduced hydrology through the diverted stretch (which may render the inventorying efforts fruitless), nor to define the ecologically necessary flows to mitigate present and future environmental damage. In the PAD there is also no mention of rapidly evolving ecological science and international flow management guidelines for environmental integrity in hydropower operations (Duxbury, 2022), nor citation of any of the broad array of environmental guidance developed specifically by the state of California.

The California Department of Fish and Wildlife (CDFW) has a well-developed Instream Flow Program (IFP) and supports the use of a variety of methods to quantify flow regimes for fish, wildlife and their habitats (CDFW, 2017). Used in conjunction with habitat and hydraulic modeling, flow duration analysis and exceedance probabilities are used as standard operating procedures by the state (CDFW, 2013). They acknowledge that "There is a consensus among experts that cumulative flow alterations resulting in instantaneous flows that are ≤30% of the MAD have a heightened risk of impacts to ecosystems that support fisheries" (CDFW, 2017). The current NF Kern minimum instream flow regime is perpetually below that threshold as it remains below 20% MAD for the entirety of the year, and is categorized between "Severe degradation" and "Poor or minimum habitat" at all times (Duxbury, 2022). However, the IFP has not been applied or

proposed for the NF Kern, and there is only a short list of special status streams that are considered for IFP protections according to the CDFW.

Even more recently, the California Environmental Flows Working Group (CEFWG), a collaboration between experts at the CDFW, State Water Resources Control Board, and other academic and advocacy groups, developed the California Environmental Flows Framework (CEFF). Unlike the IFP which is inconsistently applied to only a few designated streams, the CEFF is meant to provide a consistent statewide approach, and "improve the scale and pacing at which environmental flow protections can be extended to rivers and streams across the state" (CEFWG, 2021). In fact, the CEFF has already been recommended by the CDFW for use in the relicensing of Devil Canyon Project in the Mojave River watershed (FERC Project No. 14797, FERC eLibrary No. 20210909-5090).

The CEFF is a based upon desktop methods using readily available data (CEFWG Database, 2021 and Zimmerman, 2021) that characterize natural instream flows based upon five functional flow components (fall pulse flow, wet-season base flow, wet-season peak flows, spring recession flow, dry-season base flow). Ecological flow criteria are developed which correspond to these components, and recommendations should match the natural flow values.

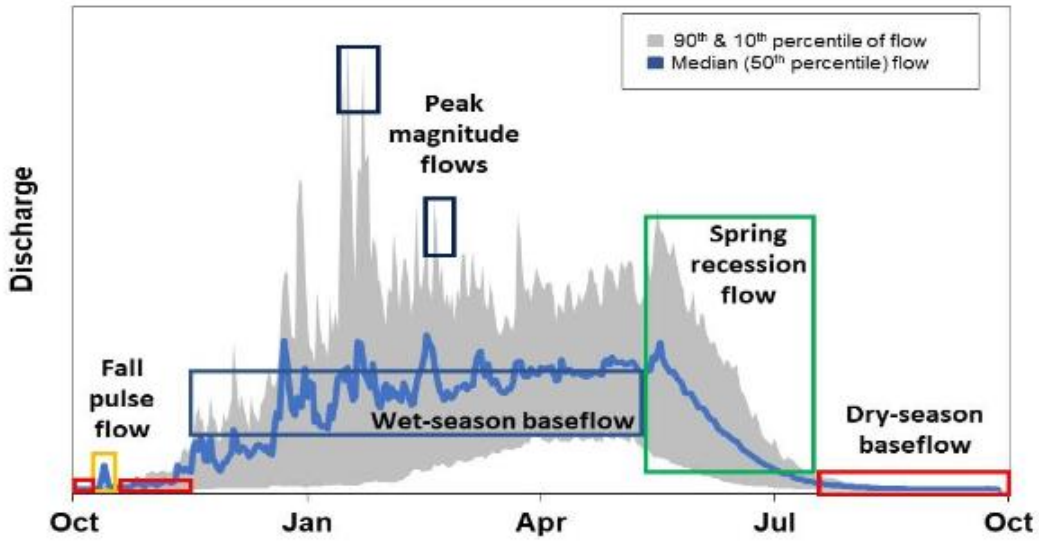


Figure 1: Image of functional flow components for a representative California hydrograph from CEFWG, 2021.

Using only the median data from all years, a functional flow metrics table was generated for the NF Kern River. An additional column was added to map the current MIF regime values to the flow components for comparison.

Location of Interest (LOI) = Kern River COMID: 14972877 NF Kern River between Camp Owens and Kernville			
Flow Component	**Flow Metric**	**Predicted Range at LOI median (10th - 90th percentile)**	**Current MIF regime in NF Kern in diverted stretch**
Fall pulse flow	magnitude	510 (213 - 1250) cfs	40 (40 - 650) cfs
	timing	Nov 14 (Oct 5 - Dec 2)	only present if incoming pulse > 600 cfs
	duration	3 (2-7) days	reduced
Wet-season baseflow	magnitude	464 (198 - 605) cfs	100-130 cfs
	timing	Feb 7 (Jan 18 - Mar 26)	April - September
	duration	124 (60-146) days	182
Wet-season peak flows (2 yr. flood)	magnitude	2930 (1880 - 10000) cfs	2330 (1280-9400) cfs
	duration	63 (1-47) days	reduced
	frequency	6 (1-5) occur	reduced
Spring recession flow	magnitude	2440 (1400 - 5250) cfs	1850 (800 - 4650) cfs
	timing	June 11 (May 21 - June 25)	earlier
	duration	78.5 (49-104) days	reduced
	rate of change	4.12 (4.27 - 8.94) %	~
Dry-season baseflow	baseflow	228 (67 - 382) cfs	40-80 cfs
	timing	Aug 25 (Jun 23 - Sept 14)	October - March
	duration	168 (149 - 236) days	182

Comparing between the natural flow regime and the current MIF regime, it can be seen that the fall pulse flow, wet-season baseflow, and dry-season baseflow are significantly different and therefore likely altered from what a natural flow regime would be. This can also be seen graphically in Fig. 2.

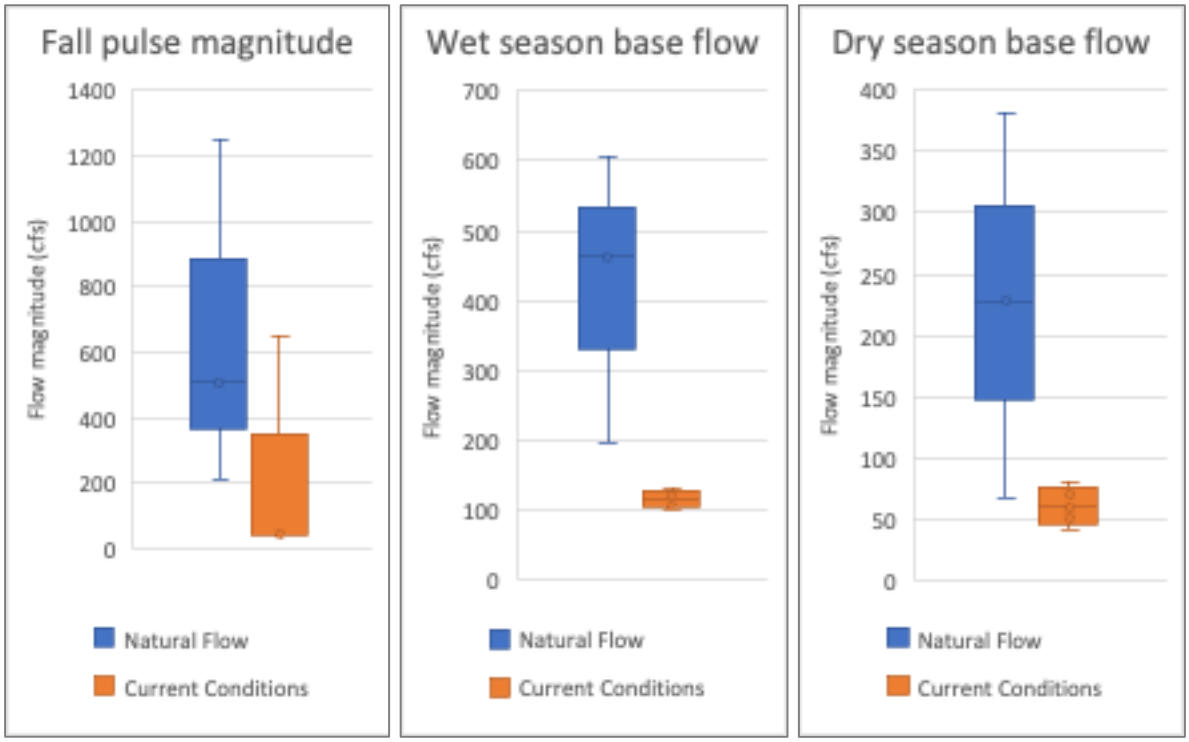
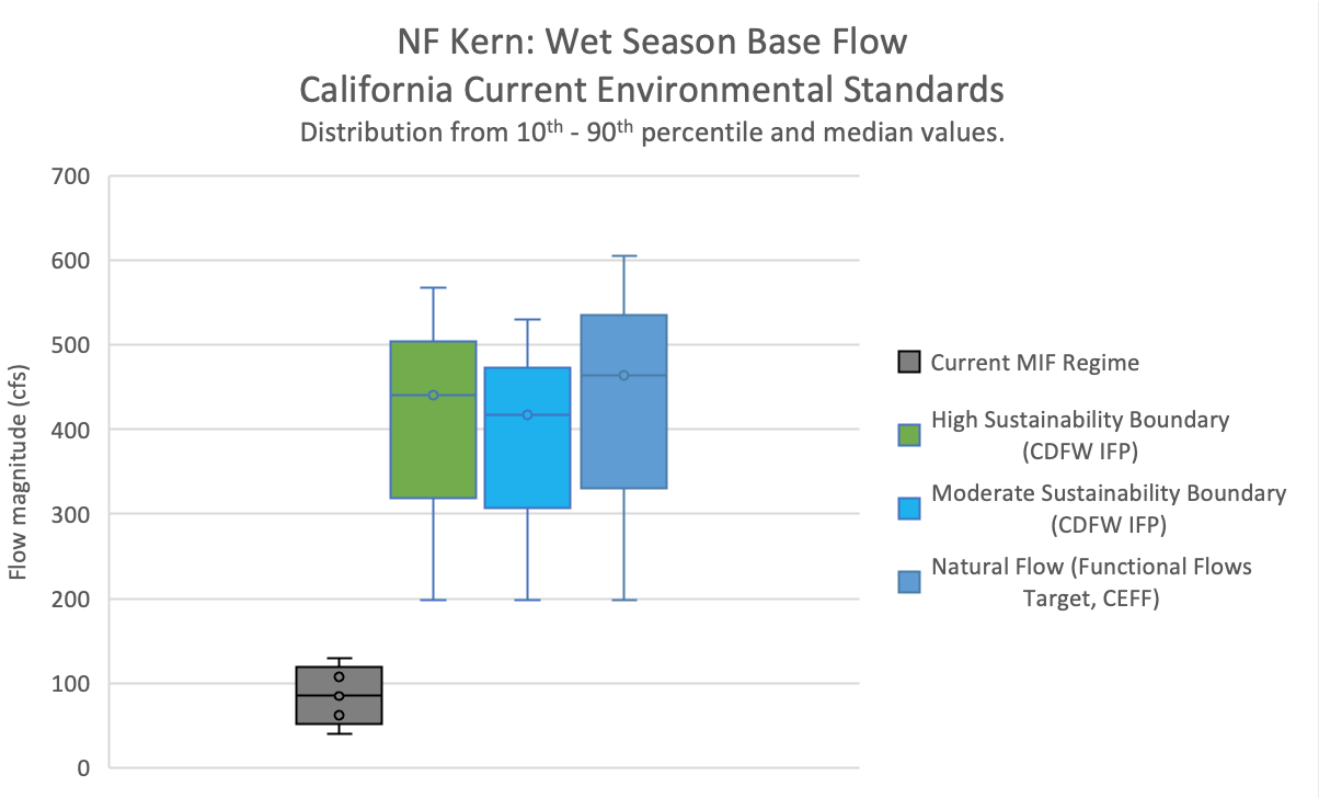


Figure 2: Comparing Natural Flow and Current Conditions of NF Kern. Box plots show whiskers from 10th - 90th percentile as well as median values. 25th/75th percentile box lines interpolated from available data.

The CDFW provides alternate low flow threshold and percentage take calculation criteria via the Sustainability Boundary methods (CDFW, 2017; Duxbury, 2022). Comparing the current MIF regime with the recommendations provided by either the CDFW or the CEFF, it can be seen that current modern environmental recommendations in California are broadly in agreement, and the current MIF regime is significantly out of sync with all recommendations (Fig 3).



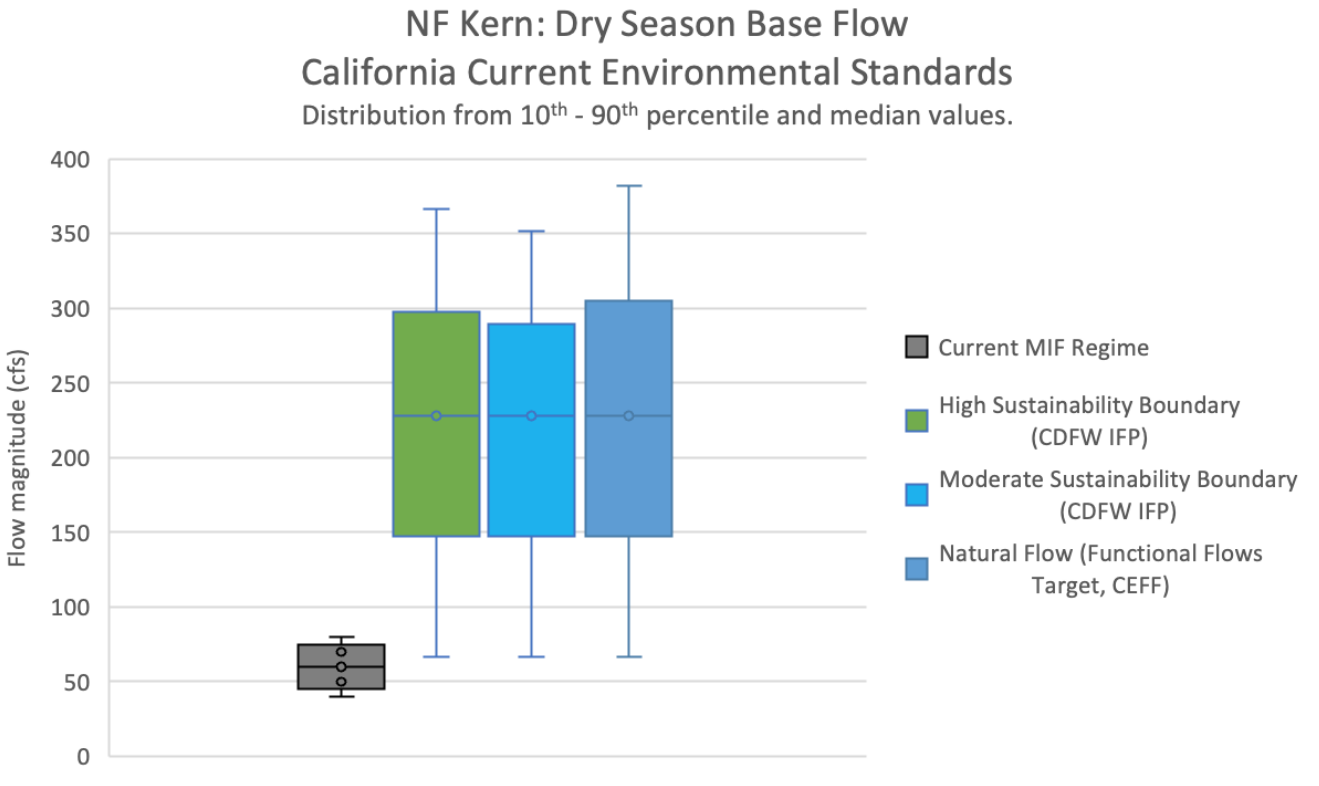


Figure 3: Comparing the Current MIF regime with the modern environmental standards in California

This preliminary analysis suggests that there is a significant discrepancy in these functional flow components between current conditions in the dewatered stretch of the NF Kern and scientifically recommended environmental flows. Therefore, conducting a full analysis per the CEFF, including full analysis by water year type (Wet, Moderate, Dry) as indicated would provide a full set of environmental flow criteria to be considered as a part of the relicensing.

Finally, note that the reevaluation of the minimum instream flow values also occurred as a part of the previous 1996 relicensing. The previous Environmental Assessment recommended that KR3: "Maintain MIF at Fairview Dam of 100 cfs from October through May and 150 cfs from June through September" (EA KR3, 1996), but this was superseded by the terms of the Settlement Agreement and ignored as a compromise between economic and environmental values.

Other previous environmental analyses also have suggested that current flow thresholds are too low: SCE presents a PHABSIM analysis which notes that the NF Kern "habitat types provide maximum habitat for [rainbow trout] fry and juvenile rearing at flows of 75 to 200 cfs. For adult rainbow trout, maximum habitat values were reached in these habitats at flows of 200 cfs." (SCE, 1991). And they also note that repeatedly when the river values are driven to their lowest extremes (as permitted and directed by the current license), population surveys found that "the estimated density and biomass of both naturally produced and hatchery-raised rainbow trout declined abruptly at all monitoring sites in 2016" due to drought, as had happened before "during the 1987 to 1992 drought". (SCE 2017, 2021). Yet nowhere in the PAD is there suggested a review of environmental flow needs, nor is there mention of the changing state of environmental science and ecological management in California.

Instead, the plant has been operating more or less the same way for 100 years, while the ecological science has evolved dramatically. Ultimately, continuing to follow "flow recommendations that deviate from ecological flow criteria may satisfy other management needs, but risk failure in achieving ecological management objectives" (CEFWG, 2021). For the sake of environmental preservation, the ecological flow criteria should be evaluated and included for real consideration.

Criterion (5) - Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The project presently takes the first 40-45 cfs of incoming flows at the Fairview diversion dam for minimum power generation, and then, after the seasonally varying minimum instream flow requirement is satisfied, takes the next 600 cfs. These conditions leave only 40-130 cfs, or less, in the dewatered reach when incoming flows are below 640

and 770 cfs, and decreases all incoming flows above 640 and 770 cfs by 600 cfs. This current project operational regime is the direct cause of the low flows in the dewatered reach as described above. The results of this study will provide environmental flow recommendations that will directly inform the development of new license requirements which will align instream flows management with modern environmental management practices.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The study should follow the methods outlined in California Environmental Flows Framework Version 1.0 (CEFWG, 2021). This framework defines each of the objectives as outlined here, and defines steps by which to carry them out:

A. Identify ecological flow criteria using natural functional flows;
B. Develop ecological flow criteria for each flow component requiring additional consideration;
C. Develop environmental flow recommendations.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The CEFF is designed specifically to be an efficient and scientifically defensible framework, which should "help managers improve the speed, consistency, standardization, and technical rigor in establishing environmental flow recommendations statewide" (CEFWG, 2021). Performing individual piecemeal studies on individual ecosystem components is expensive, time consuming, and difficult to tie together into a complete watershed management plan. As such, the CEFF presents a streamlined process that can be used in a desktop fashion with data that is readily available already to determine the baseline ecological flow criteria from natural functional flows. The additional flow component data (water temperature, DO, and physical habitat) can be incorporated with the natural functional flows in order to generate an entire representative set of ecological flow criteria. No additional field work beyond what is already proposed is required for this study.

"Water managers need a consistent statewide approach that can help transform complex environmental data into scientifically defensible, easy-to-understand environmental flow recommendations that support a broad range of ecosystem functions and preserve the multitude of benefits provided by healthy rivers and streams" (CEFWG, 2021), and that is exactly what this study is meant to provide.

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KRB STUDY REQUEST 8: Whitewater Flows

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to establish the inventory of days whitewater recreation is lost to project operations. It will elicit the ranges of flow at which enjoyable low flow boating and low-optimal flow boating exist for each form of whitewater recreation. That information, coupled with the historical hydrograph of incoming flows at Fairview Dam, will paint a full picture of project effects in the dewatered reach, thus informing both the scope of the problem to be mitigated and the opportunities for mitigation.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with nondevelopment values, including recreational and environmental values, in its formation of hydropower licenses in a manner best adapted for the affected resource, its user groups, and the goals of existing management plans. The United States Forest Service is charged with establishing conditions in hydropower licenses that are necessary for the public's utilization and enjoyment of the affected resource, including whitewater recreation. The results of this study will further the managing agencies' goals by providing solid data about project effects and potential enhancements *vis-à-vis* the number of days incoming flows at Fairview Dam are sufficient for whitewater recreation in the dewatered reach, but those opportunities are removed by project operations. This study would accordingly serve the public interest in the design of a license best adapted for use of this public resource.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

The proposed study seeks to update, supplement, and replace the only existing on-water study of whitewater recreational flows on the NFKR: the 1994 Edison study.

The 1994 study methodology and report was heavily criticized by American Whitewater when it was released.[193] It did not test any flows between 275 and 675 cfs.[194] It did not comport with the accepted contemporary methodology described in Whittaker (2004).[195] Most important, times have changed: boater enjoyment of low water creeking has increased, new boater skills for enjoying low water boating have been developed, and boat designs have made low water boating more enjoyable. There is a new generation of boats, boaters, and boating skills on the Kern that were simply not present in 1994 and thus were not accounted for in the study.[196]

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

By taking the first 605 cfs out of the river at Fairview Dam once MIF requirements are met, project operations significantly decrease water levels on the dewatered stretch below. The results of this study will help inform the inventory of days on which the diversion denies the public opportunity for whitewater recreation, which is the only way to fully capture the effects of project operations and understand the scope of effects to be mitigated, along with informing managers of when there are opportunities to mitigate those effects. This study will also prevent old, misleading data and analysis from the 1994 study from invading the current process. Edison has clearly signaled it intends to use the 1994 study in this proceeding.[197] A new study with contemporary boats, boaters, boating techniques, and study methodologies will ensure that the 1994 study not have undue or unmerited impact on managing agencies as they attempt to capture and understand the full impact of project operations on NFKR recreation.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

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[193] FERC eLibrary No. 19941011-0107, available: https://www.kernriverboaters.com/s/19941011-0107_AW_BOAT_STUDY_CRIT.pdf
[194] FERC eLibrary No. 19940802-0010, available: https://www.kernriverboaters.com/s/1994WhitewaterBoatingStudy.PDF
[195] Whittaker, *et al*., *Flows and Recreation: A Guide to Studies for River Professionals* (2005).
[196] See *supra*, § 5.7.4.1. Whitewater Boating
[197] PAD at pp. 5-139 & 5-140, 6-5; PAD Appendix A-1 through A-3 & REC-1 at p. 4; 2021FEB10 TWG

Whittaker *et al.* (2004) have described how to conduct a Level 4 on-water controlled flow study. We propose and will support a study consistent with those standards. It would include a range of boating craft: oar rigs, paddle rafts, shredders, open canoes, hardshell kayaks, inflatable kayaks, riverboards, and stand-up paddleboards. It would take place with at least five regulated flow levels: 200, 300, 400, 500, and 700 cfs. It would distinguish between "segment 1" (the dewatered reach above Hospital Flat) and "segment 2" (the dewatered reach below)[198], and be open to all interested boaters, commercial and noncommercial. It would have a simplified evaluation process compared to that of the 1994 study. And it would take place prior to peak snowmelt, when KR3 operations are more likely to deprive boaters of recreational opportunities.[199]

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The cost for this study could be moderate-high. The cost and effort are justified given the vast inventory of days project operations remove all opportunity for whitewater recreation on this river[200], the protected nature of this river given its outstanding recreational values, and the importance of this river to all of Southern California.

[198] See PAD at p. 5-52 (steeper, more channelized nature of Segment 1 (which includes the popular Fairview, Chamise Gorge, and Ant Canyon runs) offers enjoyable boating at flows lower than are required for enjoyable boating in Segment 2)
[199] See *supra*, Figure 22: NFKR Median Flows (cfs) 1997-2020, By Half-Month
[200] See *supra*, at Figure 22: NFKR Median Flows (cfs) 1997-2020, By Half-Month, Figure 23: NFKR Median Daily Flow (cfs), 1997-2020 & Figure 24: NFKR Median Exceedances, 1997-2020

KRB STUDY REQUEST 9: Comparative Whitewater Opportunities

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to compare and contrast available whitewater recreational opportunities for people from Southern California with those from the Bay Area. It will reveal the inventory of whitewater opportunities afforded to residents of each area and identify whether any differences are due to natural or regulatory differences.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

Not applicable.

Criterion (3) – if the requester is not a resource agency, explain any relevant public interest considerations in regards to the proposed study.

The Commission is charged by the Federal Power Act to balance developmental values with nondevelopment values, including recreational and environmental values, in its formation of hydropower licenses in a manner best adapted for the affected resource, its user groups, and the goals of existing management plans. The United States Forest Service is charged with establishing conditions in hydropower licenses that are necessary for the public's utilization and enjoyment of the affected resource, including whitewater recreation. The results of this study will further the managing agencies' goals by providing solid data about the differences in whitewater recreational opportunities between people in Southern California in comparison with those living in the greater Bay Area.

Criterion (4) – Describe existing information concerning the subject of the study proposal, and the need for additional information.

We are not aware of any information in the FERC record looking at available whitewater recreation through the eyes of a resident of Southern California verses the eyes of a resident of Northern California.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

By taking the first 605 cfs out of the river at Fairview Dam once MIF requirements are met, project operations significantly decrease water levels on the dewatered stretch below. Study results could underline the importance of the NFKR to Southern California whitewater recreation, reveal contemporary social expectations with regard to whitewater

recreation, and inform the agencies on the scope to which other mitigation schemes impose curtailments and disruptions to hydropower operations in the public interest.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The methodology would be desktop study with written public input. The study would evaluate the current opportunities for whitewater recreation afforded both interested persons and enthusiasts in Southern California, and to compare them with the same opportunities for interested persons and enthusiasts living in the Northern part of the state — specifically, what options are seasonally available to persons of different whitewater skills/crafts/interests who live in, for instance, Los Angeles, San Diego, and Orange and Riverside Counties compared with persons who live in San Francisco, Sacramento, and the greater Silicon Valley.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

Since this would be a desktop-only study with solicited written input, the cost would be low to low-moderate. The effort and cost are justified given the vast inventory of days project operations remove all opportunity for whitewater recreation on this river[201], the protected nature of this river given its outstanding recreational values, the visceral importance of this river to Southern California, and the statutory duty of the managing agencies to balance and adapt the proposed license to mitigate the effects of the project on this outstanding recreational public resource in the public interest in line with contemporary social values.

[201] See *supra*, at Figure 22: NFKR Median Flows (cfs) 1997-2020, By Half-Month, Figure 23: NFKR Median Daily Flow (cfs), 1997-2020 & Figure 24: NFKR Median Exceedances, 1997-2020

V • INFORMATION REQUESTS

KRB IR1: CAISO BID HISTORY

The California Independent System Operator ["CAISO"] creates and regulates the California energy market. Through its pricing mechanisms, the CAISO market signals 24/7/365 through its prices whether power generation is highly valuable to the grid (by offering high prices), moderately valuable to the grid (moderate prices), or marginally valuable to the grid (low prices). It even signals when power generation if harmful to the grid by offering negative prices.

Edison participates in the CAISO market, bidding the power produced by KR3 into the "day ahead" market.[202]

The Federal Power Act, as interpreted by the Commission, charges it with balancing the noneconomic value of recreation against the economic value of power generation and designing a license that is best adapted to the project given the relative strength of these competing values.

One obvious metric of the economic value of power generation to our society is the prices reflected on CAISO's market. If there are various times of day, days of the week, or month of the year, in which generation is marginally or negatively valued, the case for favoring noneconomic values such as recreation and the environment in the Commission's delicate balancing analysis may be relatively enhanced.[203] Knowing how Edison's generation of power has been valued by the CAISO market — which is about as fair an indicator of that power's social utility can be — is the starting point in evaluating whether there are times its energy is only marginally useful or even disfavored by our contemporary energy market.

For these reasons, we request that the Commission direct Edison to provide the complete historical record of its bids into the day-ahead CAISO market in Excel spreadsheet format on its relicensing website for stakeholders and the managing agencies to examine and evaluate as a necessary condition of moving forward with the pre-application process.

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[202] Dan Keverline, KR3 Managing Operator, 10FEB2021 TWG

[203] See *supra*, § 4.6. Other Project Information

KRB IR2: TURBINE FLOW-EFFICIENCY FORMULA

The amount of water diverted by the project at Fairview Dam fluctuates over time between a minimum of zero cfs and a maximum of about 600 cfs, for at least two reasons germane to this proceeding: (1) proposed environmental and recreational mitigation measures may require the limitation of the amount of water Edison is permitted to divert; and (2) incoming flows above Fairview Dam may be insufficient to fill the diversion capacity.

In either case, it is important to know how much energy can be produced at a given rate of diversion. Since the relationship between the quantity of water diverted and the amount of energy the project produces is not linear, the full impact of mitigatory measures on generation, and the full value of generation to begin with, cannot simply be deduced by taking the operating capacity the project (36.8 MW) and multiplying by the percentage of the maximum flow (600 cfs) being diverted; there would be a missing efficiency quotient in the equation.

To fully capture these values, one requires a table or, for the most accurate representation, a formula that supplies us with the efficiency quotient: the ability to know exactly how much energy it produces at a given diverted flow between zero and 600 cfs.

The Commission is charged with balancing the claims of environmental and recreational mitigation against the economic value of power generation, but the latter cannot be captured and evaluated without knowing how much electricity is being produced at each potential (0-600) given flow. For these reasons, we request that Edison provide by June 01, 2022 a flow-efficiency formula or table (increments of 10 cfs) that tells us how much power it can generate at each potential flow in Excel spreadsheet format on its relicensing website for stakeholders and the managing agencies to examine and evaluate as a necessary condition of moving forward with the pre-application process.

KRB IR3: NFKR HOURLY HYDROLOGY, 1997-2021

It is axiomatic that one cannot capture and examine the impact of a hydroproject on a river without knowing how much water it takes out of that river. The USGS offers publicly available data for Gauges No. 11185500 and 11186000, which monitor diverted flows in the project's conveyance and spared flows in the riverbed below Fairview Dam, respectively. However, that data is only for the value of "daily average flow" — i.e., the arithmetic mean of values captured throughout any given day.

A daily average flow is a place to start evaluating a project's events, but it is a blunt instrument, and leaves out the project's more granular effects when viewed on an hourly basis — especially during those times of year when the diurnal is significant. Edison provides hourly data to the public in real time, but that data is quickly lost to the public, as there is no publicly available historical record of it.

At the April 29, 2021 TWG meeting, David Moore promised managing agents and stakeholders, who had been asking for the historical record of hourly flows at both gauges for months, that Edison was compiling that data and would provide it to the public in the Spring of 2022. We ask that the Commission instruct Edison to keep that promise as a condition of moving forward with the pre-application process and provide by June 01, 2022 historical hourly flows from both gauges in Excel spreadsheet format on its relicensing website for stakeholders and the managing agencies to examine and evaluate as a necessary condition of moving forward with the pre-application process.

KRB IR4: CREEK HYDROLOGY

The Commission has the authority to not reauthorize portions of a hydroproject on the grounds that their cost to the environment or recreation does not justify those portions' contribution to power generation.

The KR3 project encumbers not just the NFKR; it also encumbers two tributaries: Salmon and Cannell creeks. At the December 09, 2020 TWG meeting, David Moore explained that the purpose of these diversions is to supplement the main diversion of the NFKR at Fairview Dam. The amount of negative impact to the environment or recreation caused by the diversions on these tributaries may no longer satisfy contemporary standards depending on how much water they contribute to the project and hence how much developmental value they provide to society.

For these reasons, we ask the Commission to instruct Edison to provide by June 01, 2022 its hydrological records for the diversion of water from Salmon and Cannell Creeks in Excel spreadsheet format on its relicensing website for stakeholders and the managing agencies to examine and evaluate as a condition of moving forward with the pre-application process.

VI • ATTACHMENT

Environmental Flow Analysis on the NF Kern, A Case Study: 1997-2020 Data Set

Elizabeth Duxbury, MS
Kern River Boaters Whitepaper (2022)[204]

Summary

Contemporary science has advanced the understanding of flow management for environmental integrity in hydropower operations. In this document, we will review and apply current analysis methods to the North Fork of the Kern (NF Kern) drainage. Flows have been diverted for hydropower on the NF Kern since 1921 when the Kern River No. 3 ("KR3") project first went online, and diversion has continued in similar manner for the subsequent 100 years. In 1987, the NF Kern was designated as Wild and Scenic because of its outstanding array of scenic, recreational, fish, wildlife, geological, cultural/historical, and ecological assets. In support of those assets, this analysis examines fundamental environmental flow protections and the natural flow paradigm which is supported by the scientific and ecological community, recommended by standards and regulatory boards worldwide, and adhered to by the state of California. Note that 30 of 33 (91%) of the papers and guidance documents reviewed and cited in this analysis have been published since the last relicensing of KR3 in 1996, indicating that the science in this field has been evolving rapidly since the environmental conditions included in that license were made. Simply maintaining the status quo in terms of environmental impact is not an environmentally sound option.

Background

The Kern River traverses nearly 165 miles from its headwaters at over 13,000' down to Bakersfield, California. The NF Kern is the main branch of the Kern, running from snow fields near Mount Whitney down to Lake Isabella and its junction with the South Fork. The NF Kern has a mean annual flow of 763 cfs. The climate is Mediterranean, with little precipitation in summer; water is provided primarily by snowmelt.

The Kern River No. 3 Hydroelectric Project (KR3) is categorized as a high-head run of river (RoR) scheme (Anderson, 2015). The project diverts up to 605 cfs of water from the river at Fairview Dam, and pipes it 16 miles downstream to the KR3 powerplant, where it is returned to the river. Fairview Dam itself is small with no storage pool behind it; it simply

[204] Available: https://www.kernriverboaters.com/s/Environmental_Flows_NF_Kern-1997-2020.pdf

enables the diversion. KR3 was constructed between 1910 and 1921, and generators began operations on April 1, 1921 (NPS, 2012).

The diversion of river water to the KR3 conveyance means that the stretch of river from Fairview Dam to the KR3 powerplant is always depleted of water when the project is operating. This alteration of the natural setting disrupts flow, sediment, and thermal regimes downstream, which in turn impacts ecological functions and river characteristics (Thieme, 2020). These changes include alterations to physical habitat (including availability, complexity, connectivity, and chemistry) with consequences for all organisms therein (Anderson, 2015; Poff 1997; Biggs 2005; Ward 1989; Tockner et al. 2000). Organisms affected range from the riparian vegetation and invertebrates that are the basis of the ecosystem, all the way up to the fish (Bilotta, 2016), reptiles, amphibians, birds, and mammals that contribute to the biodiversity of the freshwater ecosystem.

Because of the potential severity of their environmental impacts, dams within protected areas (such as those designated within the Wild and Scenic River System) should all implement environmental flow regimes (Thieme, 2020). Among the ecological science community, the consensus view is that a natural flow regime sustains the ecological integrity of river systems (McManamay, 2013). A large body of scientific literature supports the "natural flow paradigm" as an important ecological objective to guide river management (Richter, 1997; Poff, 1997; Bunn, 2002; Postel, 2003; Arthington, 2006). Stated simply, the key premises of the natural flow paradigm are that "maintaining some semblance of natural flow regimes is essential to sustaining the health of river ecosystems and that health is placed at increasing risk with increasing alteration of natural flows" (Richter, 2011). Determining the requisite flow regime and analyzing the impacts can be daunting due to the numbers of metrics and variables surrounding such complex systems. The Instream Flow Council recognizes over 30 different documented methods for flow analysis (McManamay, 2013), all of which attempt the quantify and mitigate against the impacts of flow depletion caused by RoR hydropower schemes. Analyses generally fall into one of three main categories:

1) Hydrological methods;
2) Hydraulic rating; and
3) Habitat rating.

Hydrological methods

Hydrological methods are often considered to be the "rule of thumb", "threshold" or "standard setting" methodologies (Arthington, 1998). Hydrological methods require a fairly robust record of historic flows upon which to perform data analysis for flow

characterization. USGS records for the NF Kern, used in this analysis, are publicly available. Gauge 11186000 measures flows in the riverbed below Fairview Dam; Gauge 11185500 measures flows diverted into the KR3 conveyance.

Hydrological methods rest on the observation that there is a close relationship between natural flows and the existing ecology in the river stretch (Jowell, 1997), and that the quantity, complexity, and quality of riverine habitat available for aquatic species depend to a large extent on the timing, frequency, duration, rate of change, and magnitude of instream flows. (Whittaker, 2006). So, by characterizing the natural changes in flow on an hourly, daily, monthly, and annual basis (Richter, 1996), and the range in variability of those flows (Richter, 1997; 1998), guidelines can be determined to define the instream flows. Metrics used include:

- Percent Mean Annual Discharge (%MAD): Defining a threshold flow based upon the mean annual discharge (MAD, or Qmean) for the reach.
- Mean minimum and maximal flows (by day, week, season, or year): Further refinement to compare to time- or condition-matched average flows.
- Exceedance probability (Q-value): Defining a threshold flow based upon the percent of time at which that flow value exceeded.
- Flow duration analysis (including by water year type, month, or season): Generating a table and graph from the range of exceedance probabilities for analysis, for all data or selected data.
- Percent of flow (POF): Evaluating amount of water diverted in terms of current incoming flows in the reach.

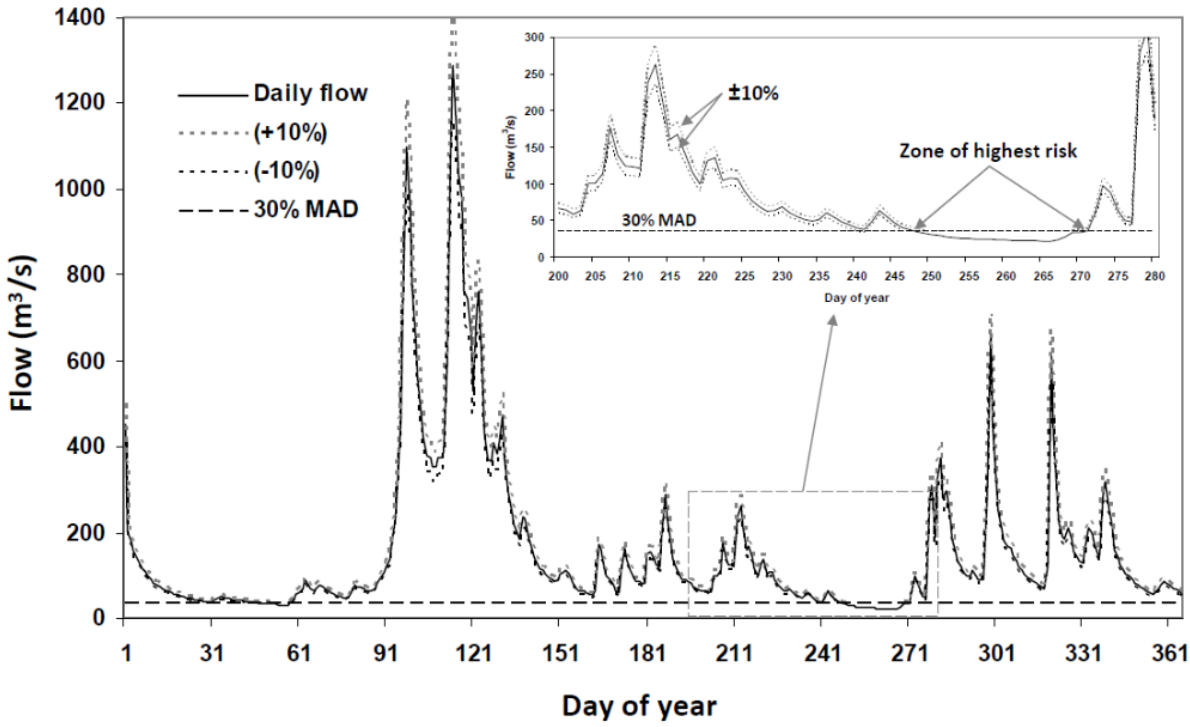

Figure 1: Image of Sustainability boundary method illustrating %MAD low flow threshold plus POF boundaries from DFO, 2013.

These metrics are combined to define a number of prominent methods:

- Tennant method: A very commonly used baseline setting method, developed in 1976, and used widely (Tennant, 1976). The method calls for maintaining flows of 30% MAD in season, 10% off season, with no flow variability protection.
- Aquatic base flow (ABF): Use a measured minimum flow (often from August when flows are low) and use to set year-round thresholds. "The fundamental assumption of the ABF method is that fish are adapted to survive the lowest flow month, so the median flow of the low-flow month can serve as the year-round base flow." (Railsback, 2000). A variant of this will calculate the lowest flows per month, and prescribe these as low flow thresholds. The assumption that fish are adapted to not just survive but thrive at these lowest measured flows has been questioned, as has the lack of natural flow variability (Richter, 2011; Railsback, 2000).
- Natural Flow Paradigm: an evolution from a simple baseline setting method like Tennant or the ABF. These methods recognize the importance of mimicking and maintaining natural flow alterations for the health of the ecosystem. As such, these methods recommend defining "boundaries" around the natural flow to define environmental flow needs:

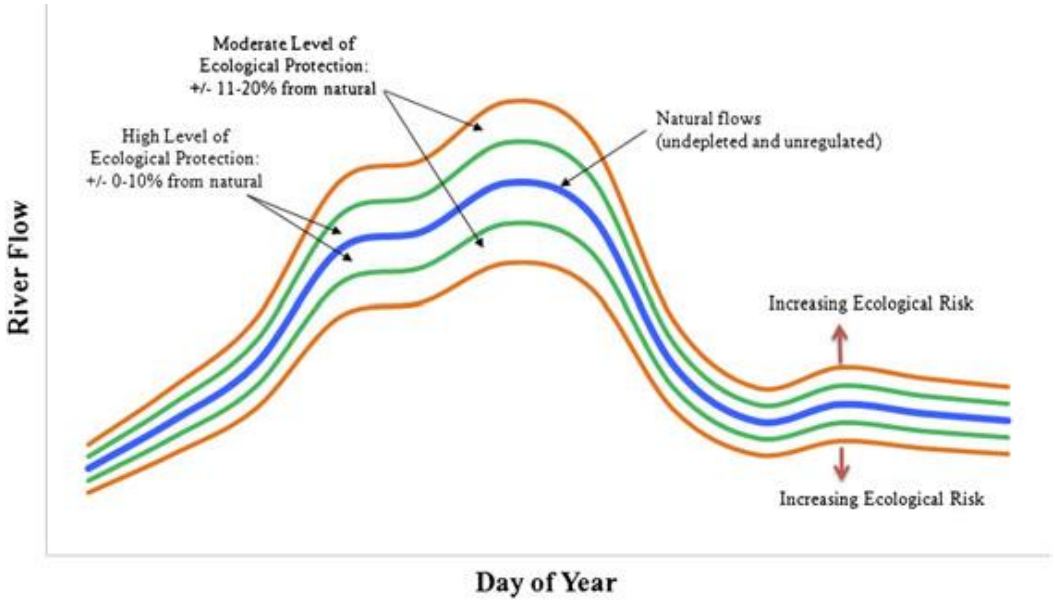

Figure 2: Image of Sustainability Boundary from Richter, 2011

These boundary approaches use a combination of a low flow threshold as before but add in a flow variability control component to ensure the ecological risk is reduced as much as feasible.

- Statistical methods: These methods, such as Range of Variability (Richter, 1997) or Functional Flow Analysis (CEFWG, 2021), attempt to characterize the instream flows comprehensively with 30 or more parameters based upon mean, minimum, maximum, and percentile flows by day, week, month, season, and year. They are then able to prescribe a rigorous schedule of flow features to maintain that characterization. These methods can be significantly more complex and subject to statistical anomalies, and are often difficult to implement, especially in a RoR scenario such as the NF Kern. Because these methods also do not specify any maximum diversion or minimum instream flow values, they will not be included explicitly for further analysis here. However, the variability concepts (Fig. 3) will be referenced in the Flow Variability Comparison, and a functional flow analysis for the NF Kern is provided and discussed briefly in Appendix A.

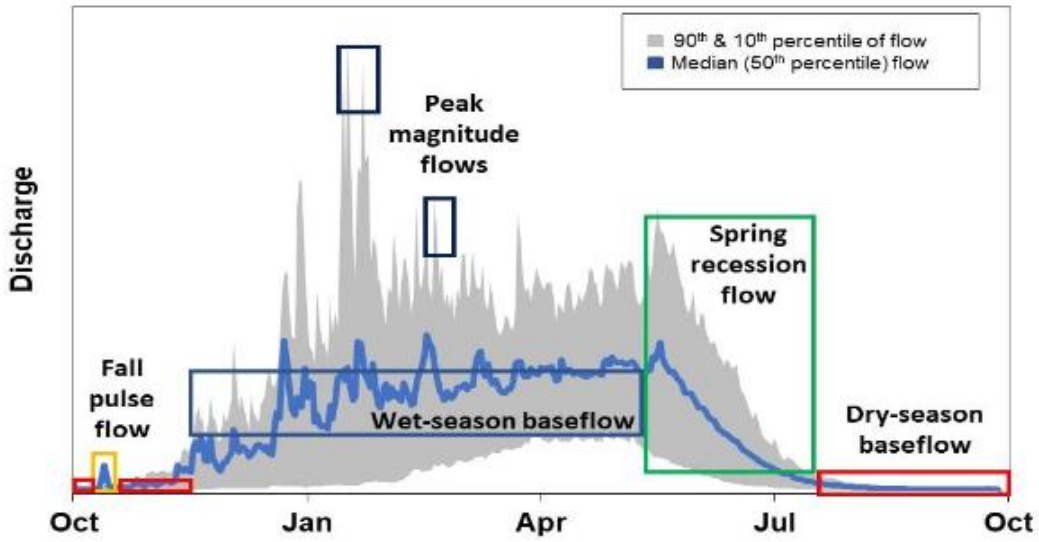

Figure 3: Image of functional flow components for a representative California hydrograph from CEFWG, 2021.

Hydrological methods are used across the country and across the world to establish environmental baselines, from which to finetune the flow management regime. Some examples:

- **California**: The California Department of Fish and Wildlife (CDFW) has a well-developed Instream Flow program and supports the use of a variety of methods to quantify flow regimes for fish, wildlife and their habitats (CDFW, 2017). Used in conjunction with habitat and hydraulic modeling, flow duration analysis and exceedance probabilities are used as standard operating procedures by the state (CDFW, 2013). They acknowledge that "There is a consensus among experts that cumulative flow alterations resulting in instantaneous flows that are ≤30% of the MAD have a heightened risk of impacts to ecosystems that support fisheries" (CDFW, 2017).
- **Florida, Michigan, and Maine** all implement Percent of Flow (POF) schemes, which recognize the importance of natural flow variability and avoid flow flat-lining (Richter, 2011).
- **Canada** defines a framework for ecological flow requirements that include a 30% mean annual discharge (MAD) low flow limit, and cumulative flow alterations less than 10% of actual flows for low impact management. (DFO, 2013).
- **Environment Agency (UK):** UK policy requires a sustainability boundary approach defined with a maintenance of a "hands off" flow in depleted stretches. The diversion may only operate when flows exceed a particular threshold, typically between Q85 and Q95 (Anderson, 2015). Above the HOF, a percent of flow (POF) is implemented to define maximum water take (EA, 2017).

- **Australia**: Recommends a first approximation of minimum flows based on percentage exceedance (flow duration boundaries) or percent of mean, with additional hydraulic and habitat rating methods to complement and monitor (Arthington, 1998). Note that the Q80 (identical to 20th percentile) lower boundary is firm and flows that are "less than or equal to the 20th percentile flow should be released downstream in very dry years" (Arthington, 1998).

Hydraulic- and habitat-rating methods

More complicated are the hydraulic rating and habitat rating methods of instream flow analysis. These categories include a variety of methods, most of which require often extensive field research efforts to complete. Common methods include wetted perimeter analysis, critical riffle analysis, or 2D hydraulic habitat models. However even with the increased cost and effort, these methods are not without their own challenges. In fact, "highly accurate hydraulic modeling seems infeasible for streams with complex channel geometry, and in any event practical hydraulic modeling cannot resolve flow patterns at the short length scales at which fish often respond to the hydraulic environment" (Kondolf, 2000).

One method (and one which has been conducted as a part of the previous KR3 relicensing process) is PHABSIM (for Physical Habitat Simulation system). This popular method attempts to measure and model the habitat area available for a fish species as the flow varies. It can be expensive to conduct and difficult to establish appropriate spatial resolution of results (Railsback, 2000).

The results of a previous PHABSIM on the dewatered reach of the NF Kern are seen in the image below (Fig. 4), which plots habitat area availability (weighted usable area, WUA) vs streamflow for specifically rainbow trout, measured across various segments of the NF Kern. In the conclusions of that study, it was noted that "WUA values indicate that these [boulder pocket water and boulder run] habitat types provide maximum habitat for [rainbow trout] fry and juvenile rearing at flows of 75 to 200 cfs. For adult rainbow trout, maximum habitat values were reached in these habitats at flows of 200 cfs." (SCE, 1991). The report also notes that issues of water temperature and angling pressure are critical factors affecting the rainbow trout, in addition to habitat suitability analysis (SCE, 1991).

Figure 3-23. Habitat Response Curves for Rainbow Trout in Segment 1 and Segment 2 for All Habitat Types Combined.

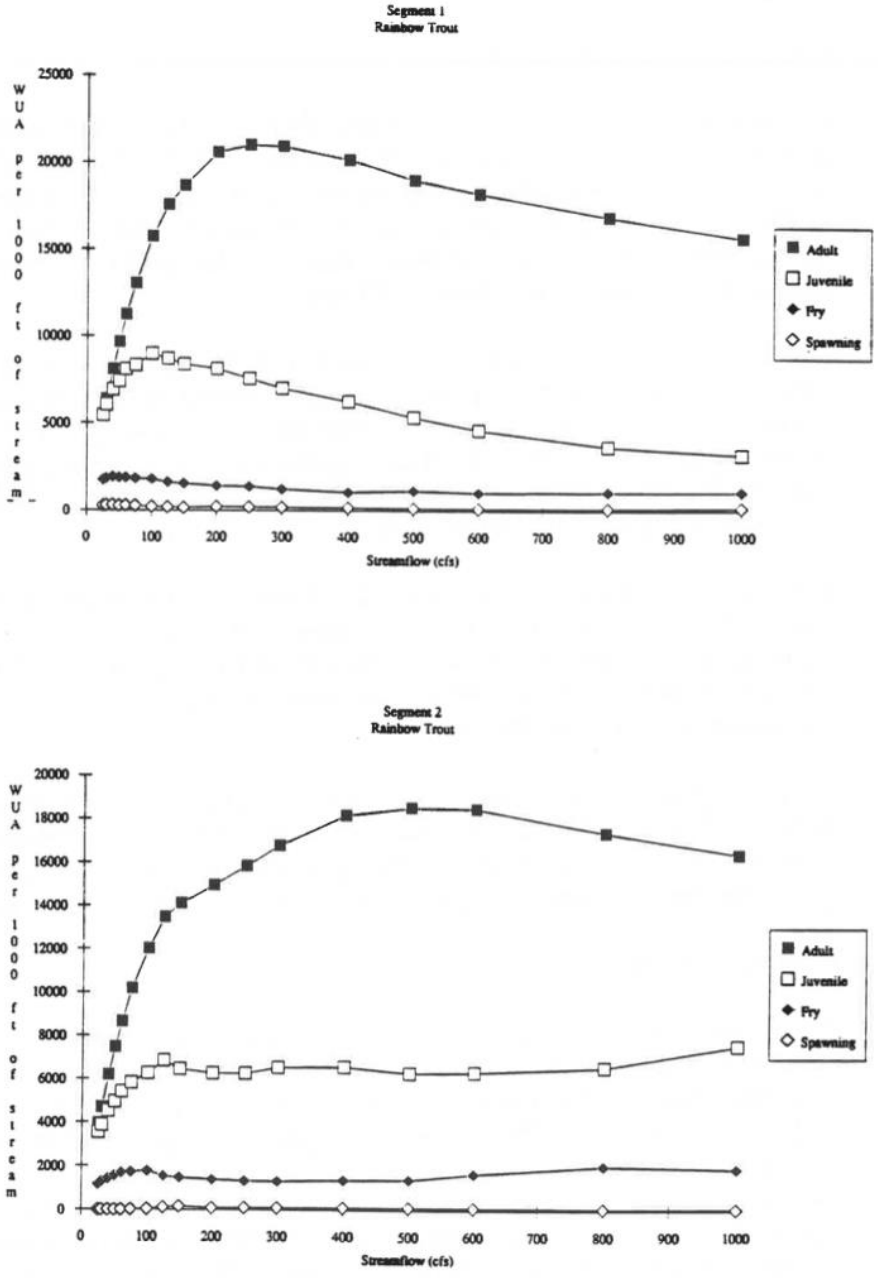

Figure 4: Image from SCE, 1991.

Methods

For this analysis, we compare the current minimum instream flow (MIF) regime and resulting flow hydrograph to 6 methods that have been used to determine ecological and environmental limits for instream flow alteration. The methods included are:

1) Current MIF regime: monthly lookup table low flow threshold, ranging from 40 cfs in winter to 130 cfs in summer, with no other flow variability protection, and 100% POF take above threshold.
2) Tennant method: the original 1976 method as defined with 30% MAD flow threshold in season (April – September), and 10% MAD in offseason (October – March). The Tennant method is somewhat outdated and frequently criticized for lack of flow variability and ecosystem impact, but nonetheless is still a useful initial baseline comparison.
3) EA Standard: the standard starting point for hydropower regimes in the UK under the Environment Agency hydropower guidance document (EA, 2017).
4) EA Low Limit: the most aggressive diversion allowable according to the EA guidance document, suitable only for "steep, upland tributaries of low ecological sensitivity with no migratory fish" (EA, 2017). Note that the Threshold Requirement remains the same; only the POF take varies (see table).
5) SB High: A sustainability boundary scheme recommended for high ecological protection. This is a regime recommended by both California (CDFW, 2017) and Canada (DFO, 2013) which recommends 30% MAD always, with 10% POF taken above the threshold. This is an evolution of the Tennant method which adds a high level of flow variability protection for the sustainability of the ecosystem.
6) SB Moderate: A sustainability boundary scheme with moderate ecological protection, which allows for 20% POF above threshold.
7) Flow duration boundaries: an initial threshold setting process is recommended in Australia to address flow requirements for fish. The method uses flow durations values of Q80, Q50, and Q20 percentile flows for drought, median and flood flows, along with statistical recommendations of variability within monthly flows (Arthington, 1998).

Methods	Threshold Requirement	Flow Variability Requirement
Current	130 cfs (summer) down to 40 cfs (winter)	None
Tennant	30% MAD in season; 10% MAD off season	None
EA Standard	Q95 HOF	Max 35% POF
EA Low Limit	Q95 HOF	Max 75% POF
SB High	30% MAD always	Max 10% POF
SB Moderate	30% MAD always	Max 20% POF
Flow duration boundaries	Q80	Q50 and Q20 events, plus prescribed variability

The goal of this analysis is to answer the question: What is an ecologically sound minimum instream flow regime and particularly low flow threshold for the NF Kern watershed, according to widely accepted standards?

Analysis

Data Set and Incoming Flow Duration Curve

For the Flow Duration Curve, data was compiled from USGS gauges 11186000 (KERN R NR KERNVILLE (RIVER ONLY) CA) ("flows in diverted reach") and USGS 11185500 (KERN R NO 3 CN NR KERNVILLE CA) ("flows diverted"). Period of data included is 10/01/1996 - 09/30/2020, for a total of 8,766 days. Data was available as a single daily average from each gauge.

By adding the flows in diverted reach and flows diverted as recorded by the two included gauges, total incoming flows above the diversion in cfs were calculated. During the study period, the minimum, maximum, and mean values for the incoming flow can be seen in the following table:

Measure	Value
Minimum incoming flow	67 cfs
Maximum incoming flow	25,219 cfs
Mean incoming flow	763 cfs

A Flow Duration Curve (FDC) was generated by calculating the number of days on which the incoming flows exceeded a flow threshold.

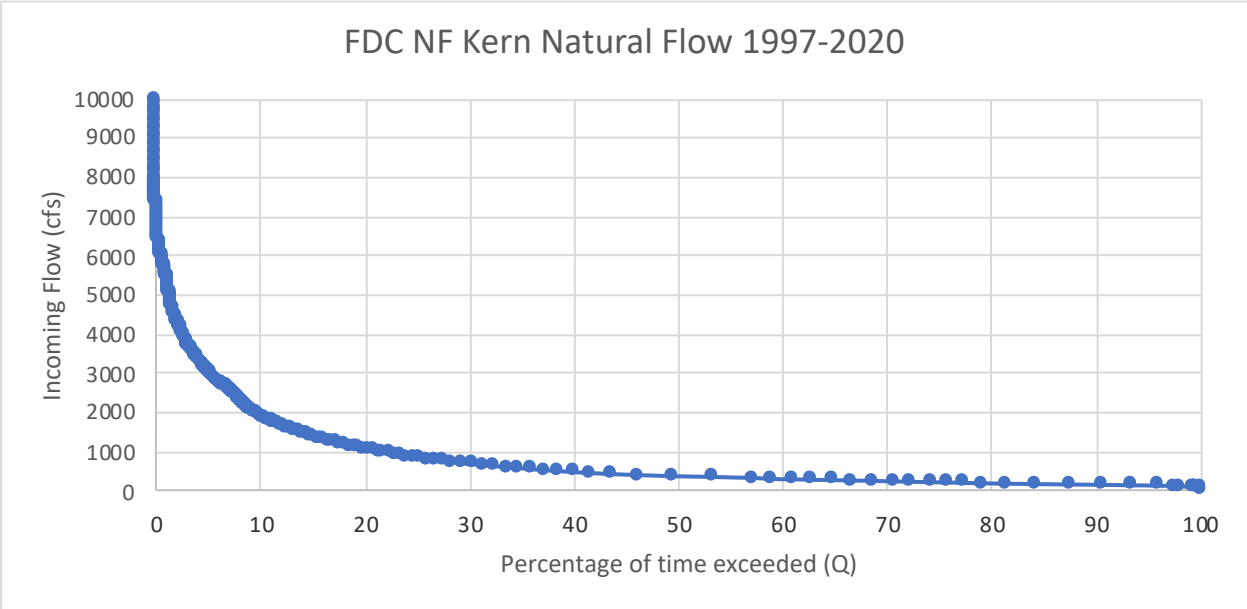

Figure 5: NF Kern flow duration curve

Zooming in on the y-axis to better see the high percentage tail of the plot:

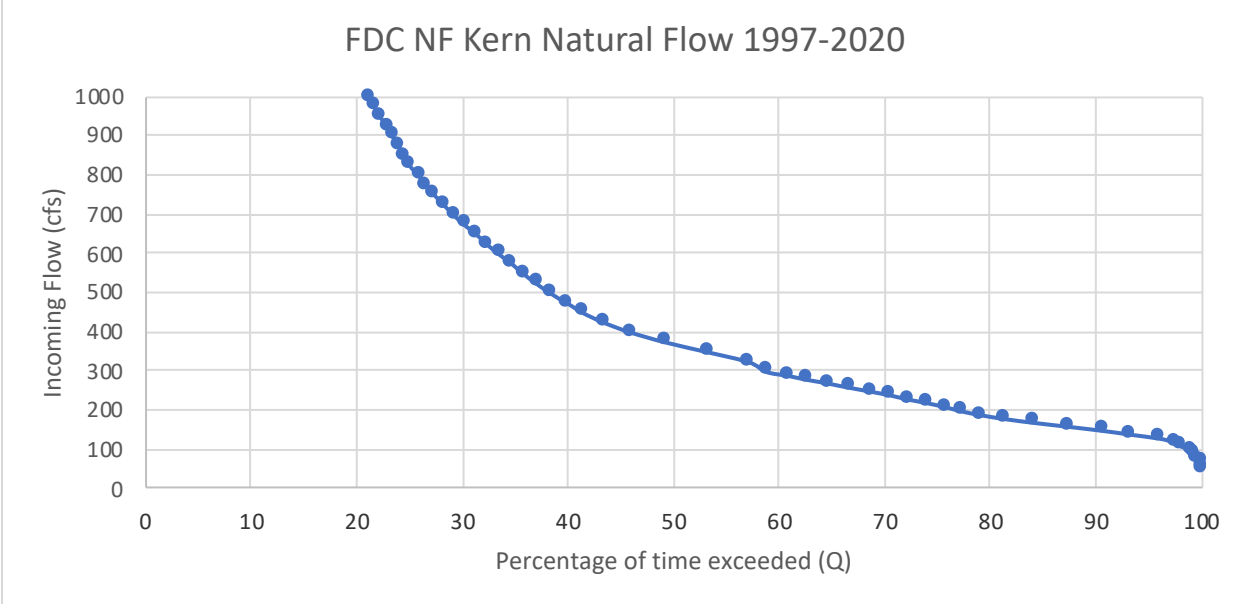

Figure 6: NF Kern flow duration curve, zoomed in to inspect low flows

Percentage of time exceeded (Q)	Value (cfs)
Qmean	763
Q99	100
Q95	135
Q90	150
Q85	170
Q80	190
Q50	375
Q40	475
Q30	675
Q20	1050
Q10	1900

Although made with a more modern data set, this flow duration curve closely resembles the one generated as a part of the 1996 relicensing (SCE, 1991). Among the current data set, 99 percent of the days recorded an incoming flow above 100 cfs (the Q99 value). 50 percent of the days recorded an incoming flow of 375 cfs or above, and 30 percent of the days recorded flows of 675 cfs or above.

Exemplary Water Year Curves

For the Exemplary Water Year Curves, data was compiled from the same pair of USGS gauges (11186000 and 11185500) for same period of data (10/01/1996 - 09/30/2020). Data was available as a single daily reading from each gauge.

Among each of 24 water years of data present, the years were broken into thirds and categorized as a Low, Medium, or High according to the average annual incoming flow at Fairview Dam. Within each third, one of the central years (not on the category boundary) was chosen as a representative case. The resulting final years selected are seen highlighted in the table below, with the average flow shown and ordered for all years:

	Average Annual Incoming Flow (cfs)	Water Year Category, by Thirds
2015	166	L
2014	239	L
2013	287	L
2007	**334**	**L**
2020	416	L
2002	434	L
2001	438	L
2012	451	L
2016	456	M
2018	485	M
1999	502	M
2004	**510**	**M**
2000	546	M
2009	571	M
2008	613	M
2003	646	M
2010	967	H
2005	1204	H
2006	1222	H
2019	**1381**	**H**
1997	1387	H
2011	1506	H
1998	1570	H
2017	1986	H

Plotting the incoming flow at Fairview for each of the High, Medium, and Low years is seen in Fig. 7, below.

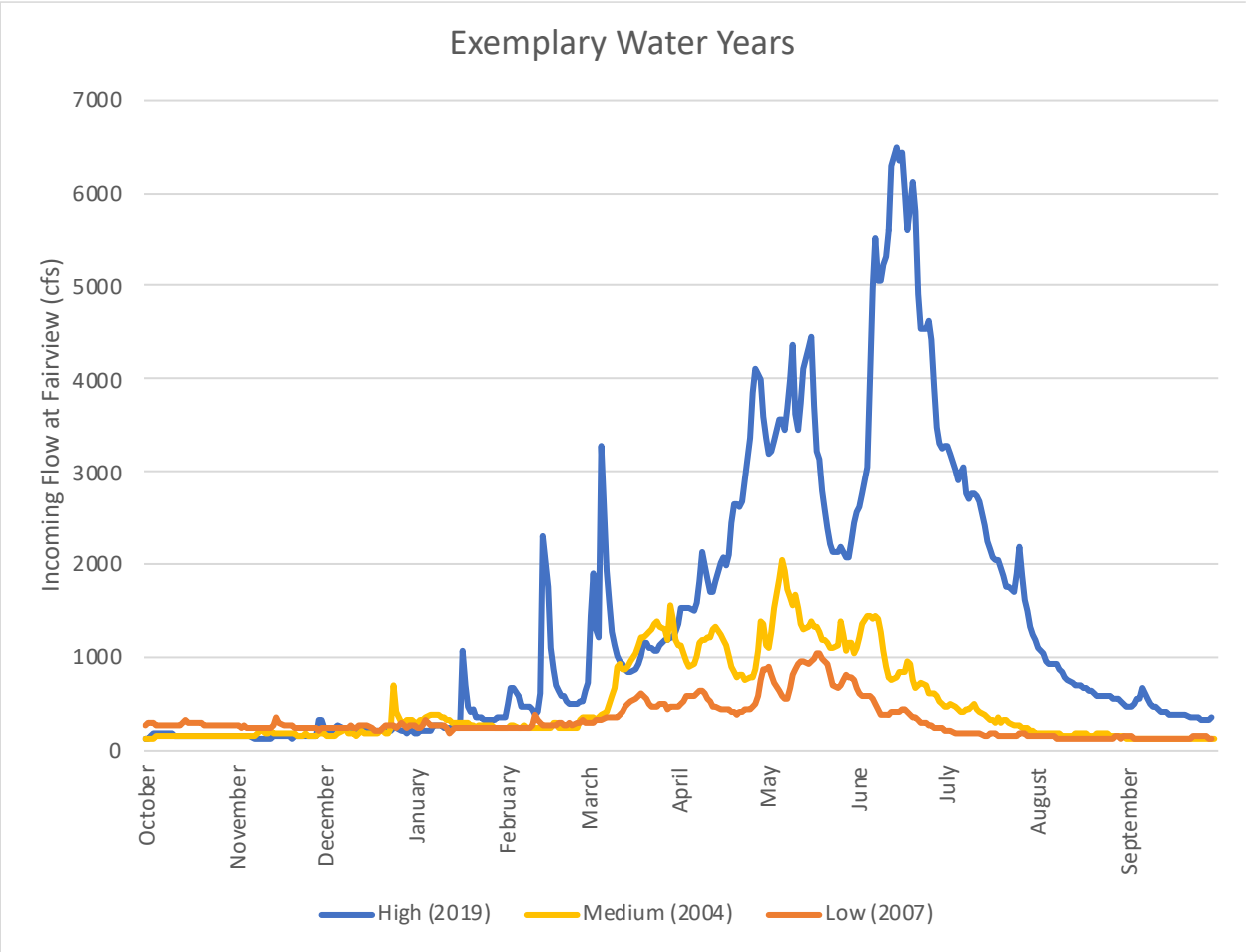

Figure 7: Incoming flow hydrographs for exemplary flow years

Current Low Flow Table

Under the current minimum instream flow regime for KR3, the water released into the bypassed reach of the NF Kern must adhere to this table, defined monthly:

Month	Flow in cfs
January	40
February	40
March	70
April	100
May	100
June	100
July	130
August	130
September	100
October	80
November	40
December	40

The mean annual discharge (MAD) and flow duration curves can be converted to the equivalent percentage of MAD and percentage exceedance (the percentage of time in which the total incoming flows would exceed that value). These values are seen in the table below:

Low Flow Threshold in Diverted Reach (cfs)	%MAD	Percent Exceedance
40	5.2	100.0
50	6.6	100.0
60	7.9	100.0
70	9.2	100.0
80	10.5	99.7
90	11.8	99.5
100	13.1	99.2
110	14.4	98.2
120	15.7	97.5
130	17.0	96.1
140	18.3	93.4

Recall that as the Q99 value is 100 cfs, much of this table is at or lower than that Q99 value; that is, ten out of twelve months of the year (83% of the year), the minimum instream flow is set at or below a value that the natural incoming flow of the river only ever drops to 1 percent of the time.

The winter low flow threshold of 40 cfs corresponds to 5.2% of the MAD (and is naturally exceeded 100 percent of the time), while the summer low flow threshold of 130 cfs corresponds to 17% MAD (and is naturally exceeded 96.1 percent of the time). According to estimates provided by the California DFW (Fig. 8), this winter flow is below the lowest 10% flow characterization and falls into the "Severe degradation" category. The summer flow at 17.0% is categorized as "Poor or minimum habitat":

Department of Fish and Wildlife Water Branch Instream Flow Program

Narrative Description of Flow	April to September	October to March
Flushing or maximum flow	200% from 48 to 72 hours	
Optimum range of flow	60-100%	60-100%
Outstanding habitat	60%	40%
Excellent habitat	50%	30%
Good habitat	40%	20%
Fair or degrading habitat	30%	10%
Poor or minimum habitat	10%	10%
Severe degradation	<10%	<10%

Figure 8: Image from CDFW, 2017.

Mapping each of the monthly flow thresholds of the current MIF regime to the corresponding %MAD and CDFW categorization is seen in the table below. No monthly flow threshold exceeds the "Poor or minimum habitat" characterization.

Month	Flow in cfs	%MAD	Percent Exceedance	CDFW Narrative Description of Flow
January	40	5.2	100.0	Severe degradation
February	40	5.2	100.0	Severe degradation
March	70	9.2	100.0	Severe degradation
April	100	13.1	99.2	Poor or minimum habitat
May	100	13.1	99.2	Poor or minimum habitat
June	100	13.1	99.2	Poor or minimum habitat
July	130	17.0	96.1	Poor or minimum habitat
August	130	17.0	96.1	Poor or minimum habitat
September	100	13.1	99.2	Poor or minimum habitat
October	80	10.5	99.7	Poor or minimum habitat

November	40	5.2	100.0	Severe degradation
December	40	5.2	100.0	Severe degradation

Finally, there is no flow variability component to the current MIF regime. See the Flow Variability discussion, below.

Low Flow Threshold Comparison

The first component of this environmental flow analysis compares the low flow thresholds between the current MIF regime and the comparison methods. The results of calculating out the low flow thresholds based upon either the %MAD or percent exceedance Q-values are displayed in the following table:

Methods	Threshold Definition	Threshold Value (cfs)
Current	130 cfs (summer) down to 40 cfs (winter)	130; 40
Tennant	30% MAD in season; 10% MAD off season	229; 76
EA Standard	Q95 HOF	135
EA Low Limit	Q95 HOF	135
SB High	30% MAD always	229
SB Moderate	30% MAD always	229
Flow duration boundaries	Q80 always	190

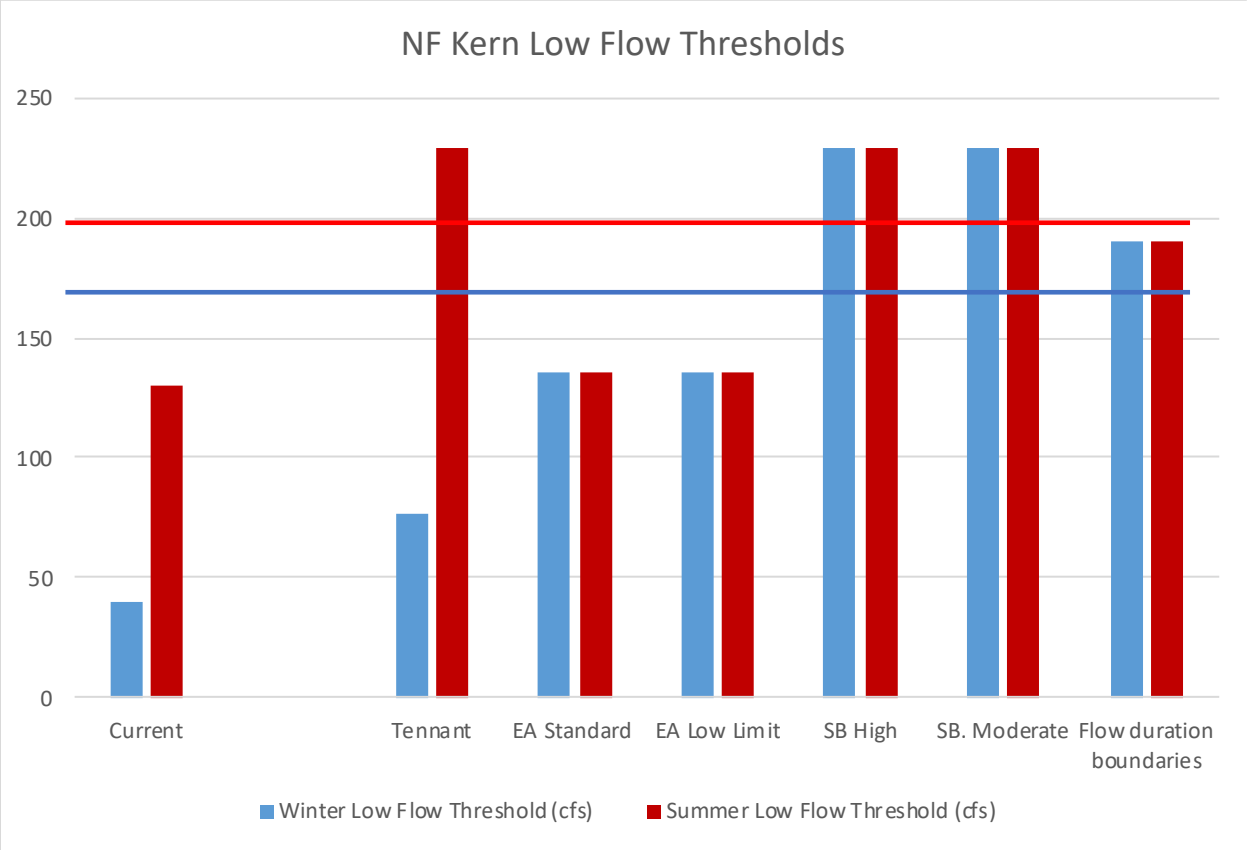

Figure 9: Bars show recommended winter and summer low flow thresholds compared to current minimum instream flow regime. The horizontal lines indicate averages of recommended methods.

The low flow thresholds of the current MIF regime are lower than every one of the comparison methods tested:

	Winter Low Flow Threshold (cfs)	Summer Low Flow Threshold (cfs)
Current	40	130
Averaged Comparison Methods	166	191
Difference (Averaged – Current)	126	61
Current as percent of recommended	24.1%	68.0%

The current summer low flow threshold is only 68% of the averaged recommended summer low flow threshold of 191 cfs. The current winter low flow threshold is even further from the averaged recommendations, at only 24.1% of the recommended winter low flow threshold of 166 cfs. The low flow thresholds would need to be increased by 126 cfs in winter, and 61 cfs in summer to meet the averaged recommendations. While not seemingly

a large amount of water, recall from the habitat suitability curves for rainbow trout on the NF Kern that as the flow decreases from 150 cfs to 100 cfs to 50 cfs, there is a steep drop-off on those habitat suitability curves; this is the zone that these threshold changes are moving through.

Even the Tennant method, the oldest of those methods included and one which existed at the time of the previous licensing, recommends increases to the low flow thresholds of an additional 99 cfs in summer and 36 cfs in winter, values in line with the "Narrative Description of Flow" table provided by CDFW (Fig. 8).

Flow Variability Comparison

The second component of this environmental flow analysis is to compare the flow variability between the current MIF regime and the comparison methods. Methods such as Range of Variability, Functional Flows Analysis and Sustainability Boundaries all attempt to quantify and prescribe what this natural variability should look like, and this can be performed in future analyses. For the flow variability comparison performed here, the variability differences will be plotted and visualized on hydrograph curves.

Plots of the three exemplary years are seen in Fig. 10. Each hydrograph shows the incoming flow curve along with the calculated minimum instream flow required by the current MIF regime. Note that these calculated flows are used instead of the flows recorded in the diverted stretch for the corresponding year because in various instances throughout the dataset, the KR3 project was not taking the full volume of water that is allocated to them (due to project outages, maintenance, lags in responding to changes in incoming flows, or recreational releases). In other instances, minimum power generation or hatchery flows were allowed to supersede the MIF, forcing instream flows even lower. A future comparison could evaluate the impact of outages and other disruptions to actual flows in the diverted stretch of river.

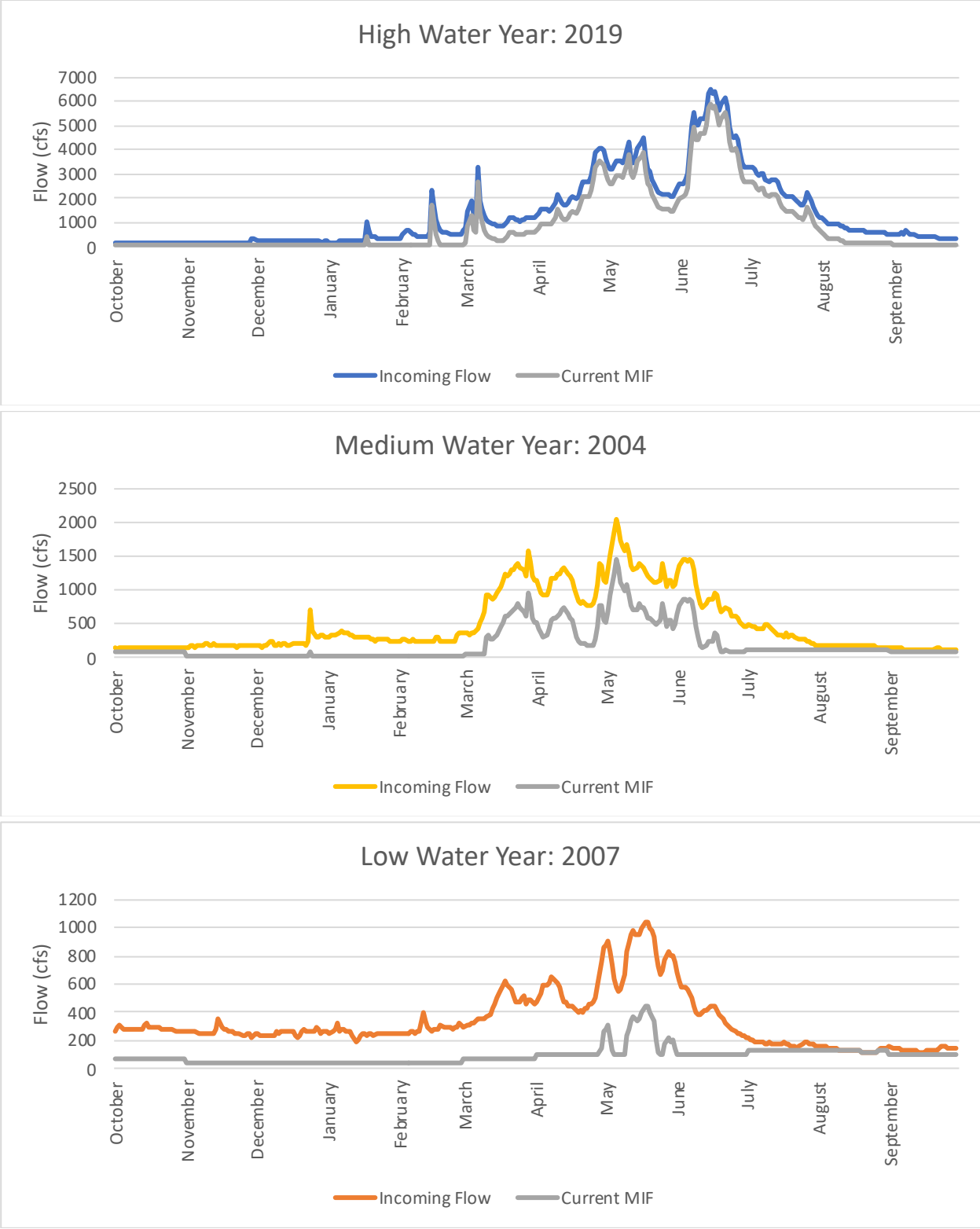

Figure 10: Hydrograph of flows for exemplary years (a) High water, (b) Medium water, and (c) Low water

In a medium- or high-water year, some natural variability of the incoming flows is propagated through to the bypassed stretch because the incoming flows will surpass the maximum possible diversion for parts of the year; but as flows drop, or during the entirety of a dry water year, the lack of a flow variability requirement means that the flows in the depleted reach will frequently flatline because the diversion is allowed to take 100% of flows over the minimum instream flow requirement.

Note in the medium year hydrograph (Fig. 10b) the extended periods of absolutely flat and unwavering flows from October until early April. Only a small one day fall pulse flow (storm bump) in December and the change of flow threshold value break the monotony. Then note again starting in July that the end of the spring recession flow (snowmelt runoff) is entirely flattened all the way through the end of September and the end of the water year.

The situation is exacerbated in a low water year (Fig. 10c) in which except for three small flow bumps spread through a 33 day period from the end of April through the entire month of May, the flows in the diverted stretch were held unvarying at the low flow threshold, showing flat lines on the hydrograph. The peack magnitude flows and spring recession flows are almost unrecognizable. This regime has removed nearly all of the incoming flow variability, which even in this low water year shows significant seasonal-, monthly- and weekly- changes.

Recall that 99 percent of the time the natural, incoming flows on the NF Kern are equal to or in excess of 100 cfs (the 1-percentile flow value). However, under the current MIF regime, flows are held at or below 100 cfs on 76% of the days in this representative water year, even though not one single day (0%) of the year had incoming flows below this 1-percentile value.

Next, each of the comparison methods are applied to the exemplary years' hydrographs. Calculated flows in the diverted stretch are determined based upon the low flow thresholds and variability requirements of the scheme. Max possible diversion is capped at 600cfs for the calculations. Note that for this analysis, the "Flow duration boundaries" will be omitted because of the vagaries of statistical definition and difficulty of implementation.

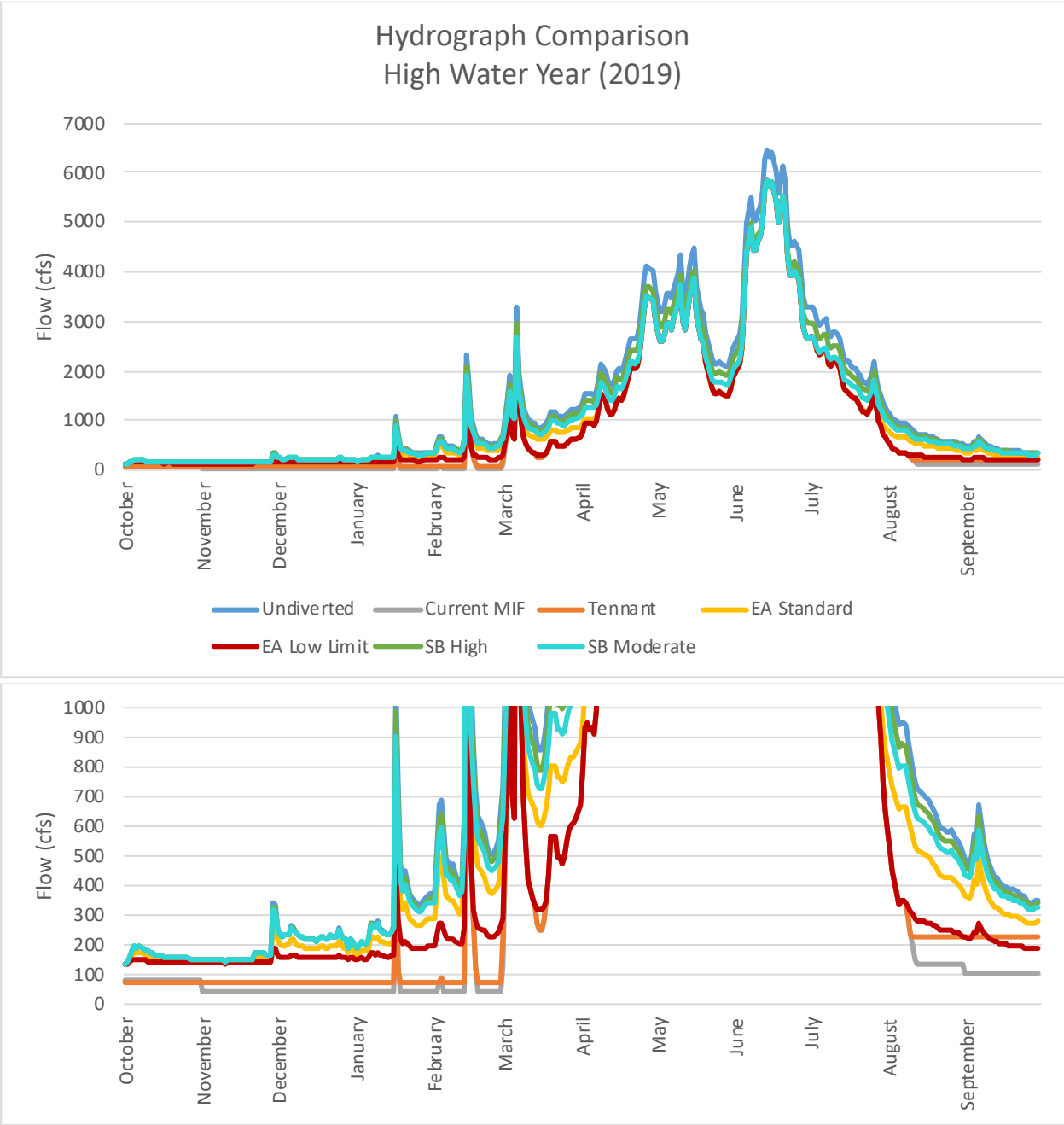

Figure 11: Hydrograph of flow comparison for example High water year (a) full plot, and (b) zoomed in to low flow zone

In the high-water year (Fig. 11), each of the comparison methods perform similarly over the full range of flow values. All exhibit significant variability correlated to incoming flows during the runoff, since based on the project capacity limits, much of the incoming flows are passed through to the diverted stretch. However, examining the low flow periods in Fig. 11b (October – March and August – September) there are still notable differences between

the schemes. The low flow thresholds are obviously different, as discussed in the previous section. But the variability of the flows is also affected. Under the Current or Tennant methods, even in this high-water year there are still significant, multi-month-long periods of flow flatlines, despite the presence of existing and fluctuating inflows. Note also that any of the methods which use a percentage take approach (EA and SB methods) preserve flow variability.

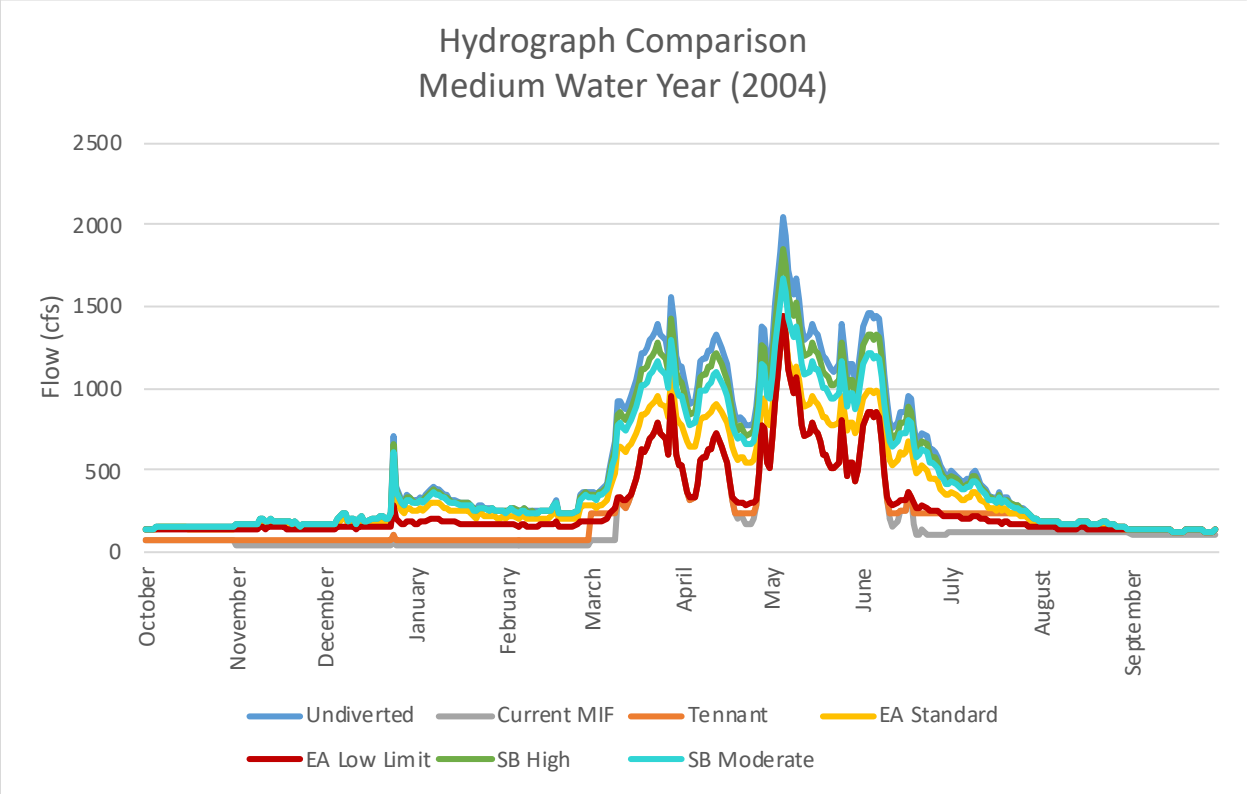

Figure 12: Hydrograph of flow comparison for example Medium water year

The same trends are observed in the medium-water year hydrograph comparison (Fig. 12). Again, during the peak runoff (mid-March through mid-June) the methods perform similarly. However, during the flow ramping period the differences become more obvious, particularly the first 5 months of the water year and again from late June through the end of September. In each of the percentage take methods (EA and SB), the calculated flows show both an increased low flow threshold value as previously discussed, but significantly also preserve flow changes and oscillations which match the variability of the incoming flow on the weekly, monthly, and seasonal windows of comparison. Under the Current or Tennant methods, the unnatural flatlined nature of the hydrograph during these periods are pronounced.

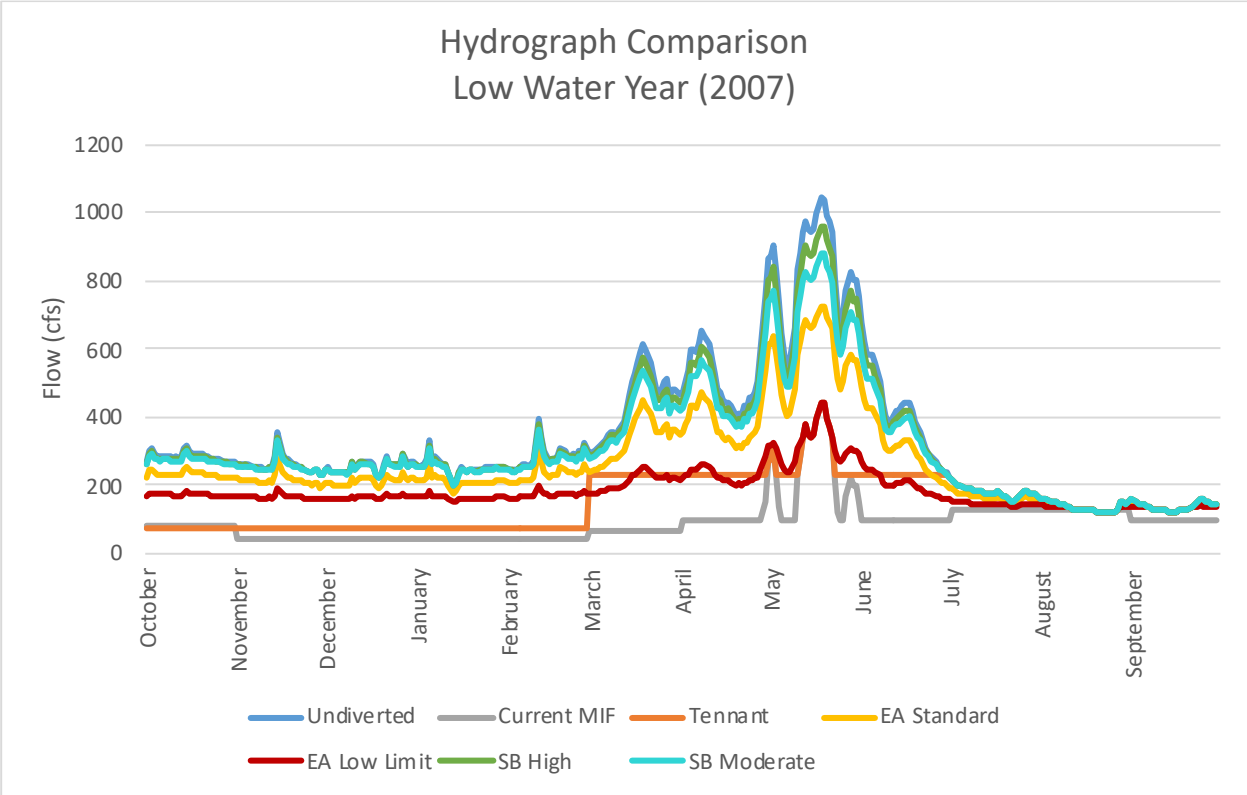

Figure 13: Hydrograph of flow comparison for example low-water year

Each of these trends are even more apparent in the Low water year hydrograph. The EA and SB methods preserve the variability of incoming flows over the entire course of the year. Even the most severe "EA Low Limit" (intended only for areas of low ecological importance) flow method preserves significant variability in the hydrograph compared to the current MIF regime. The somewhat outdated Tennant method agrees with the "EA Low Limit" in terms of flow magnitudes, but like the current MIF regime, Tennant preserves no flow variability apart from the biannual threshold change, and the forced variability when the incoming flows drop below the required threshold (most of August and September in this example).

An alternate way to visualize flow variability is by plotting the flows that remain in the diverted stretch compared to the incoming flows above Fairview Dam, and comparing the resulting curve from the Current compared to the same 5 comparison methods. This can be seen in Fig. 14. Viewed in this fashion, it can be seen that under the current MIF regime, when the incoming flows are less 600 or 700 cfs (in winter or summer respectively) all variability in the incoming flows is lost and flows in the diverted stretch are always set at the minimum instream flow regime's flatline. The Tennant method shows an identical pattern, but with a higher threshold value. All of the other methods (both EA methods and

both SB methods) show higher values in the diverted stretch at all times, as well as flow variability at all times as the incoming flows move through this currently flat lined area.

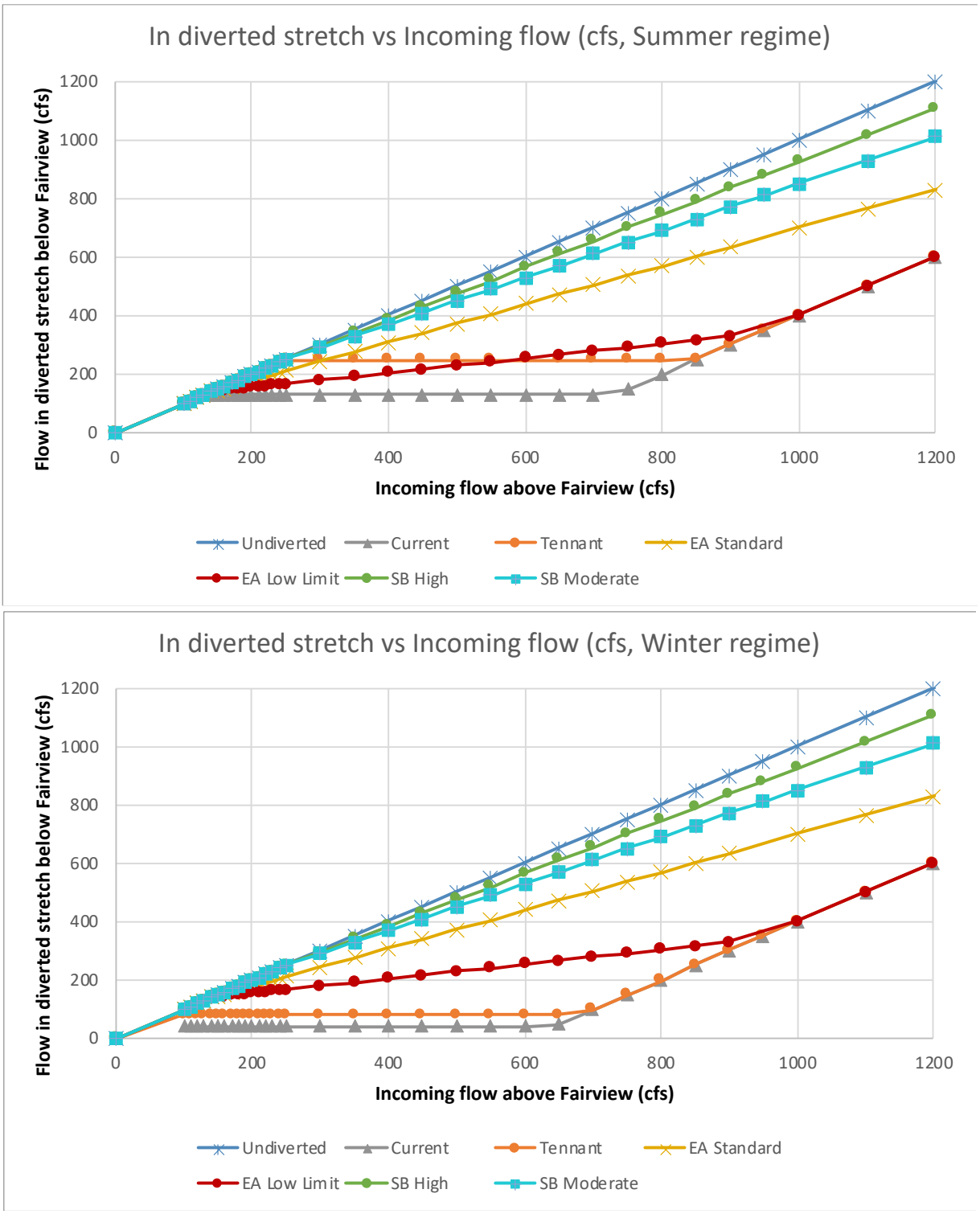

Figure 14: Incoming flows in the diverted stretch of river for (a) Summer and (b) Winter. Note only Current and Tennant methods vary by season.

Note that these incoming flows in diverted stretch plots do not consider or include the minimum power generation flow, which is permitted to take priority over the minimum instream flow and can drive the actual flow in the diverted stretch up to 45 cfs lower than the current minimum instream flow regime would otherwise allow.

Discussion

In an analysis of six hydrological methods representing the collective consensus on ecological responsibility for hydropower regimes as recommended by the California DFW, Canada Department of Fisheries, Environment Agency of UK, and Environment Australia, as well as broad unanimity across the ecological research community, there is agreement amongst all methods that the NF Kern is currently underwatered as a result of KR3 hydropower operations, and lacks the requisite features of an environmental flow regime. The methods analyzed recommend:

- Maintain 166 – 191 cfs hands-off flow in the diverted stretch at all times as permitted by incoming flows;
- Use a percentage take above the hands-off flow in order to better mimic the natural hydrograph

The health and maintenance of the Wild & Scenic NF Kern ecosystem depends upon a restoration of flows to better align with these flow requirements. The leadership of the state of California (via the California Water Resilience Portfolio initiative) understands and emphasizes the importance of prioritizing the protection and enhancement of natural ecosystems (CNRA, 2019). The California Department of Fish and Wildlife have developed a thorough suite of guidance documents (the Instream Flow Program) which provide the guidance to implement these protections (CDFW, 2017) and to specifically consider the specific needs of the trout fishery within the Kern (CDFW, 2021).

For a more local and specific example of why this is important, consider the yellow-legged frog. The yellow-legged frog was once abundantly present in the Sierra Nevadas (CBD, 2021; Hayes, 2016). Currently, the yellow-legged frog has experienced significant population decline in most known historical locations and is nearing extinction in parts of its range. “Water development and diversions are likely to be the primary cause of population declines and are currently a prominent risk factor because they result in hydrological changes that chronically affect several aspects of the species’ life history” (Hayes, 2016). Over the last 100 years of water diversion within the Kern drainage, the number of yellow-legged frogs present has plummeted in the affected project environment. They do still exist nearby and just a few miles upriver (SCE, 2021), but the current minimum instream flow regime and other project impacts have removed them from their historic habitat. Notably, one of the requirements of the yellow-legged frog is a flow

regime that can “Mimic natural hydrograph to degree possible [and] restore some components of spring snow-melt hydrograph” (Hayes, 2016).

Other topics for future exploration include the impacts of the flows in the diverted stretch on health (temperature, contaminants, and bacterial load), aesthetic, and recreational value of the project reach. Additionally, at times there can be significant diurnal swing in the flows of the NF Kern that cannot be captured or analyzed in a dataset that is an average of one day’s flows. If hourly flow data were available, more analysis could be conducted.

Finally, since only desktop methods are included here, none of these methods can portray a full picture of the complex riverine habitat, and it must be acknowledged that all included methods are recommended as a starting point for river integrity.

Further data can and should be acquired through additional field data collections or analyses including hydraulic, habitat, and population monitoring. Note that when this has been done historically, the physical habitat analysis for trout and rainbow trout specifically agreed with the present survey of international consensus in recommending flows around 200 cfs for the native and stocked trout of interest to survive and thrive at all stages of life (SCE, 1991, 2021). And when population surveys have been carried out, it was found that “the estimated density and biomass of both naturally produced and hatchery-raised rainbow trout declined abruptly at all monitoring sites in 2016” due to drought, as had happened before “during the 1987 to 1992 drought”. (SCE 2017, 2021). The estimates of rainbow trout abundance at five sites above and below Fairview Dam showed that while 51% of the rainbow trout survived from 2011 to 2016 samples at site above the dam, only 5% of the rainbow trout remained over the same period from sites below the dam in the dewtered reach (SCE, 2021). So there is a large space above the current regime for ecological improvement.

Further analysis with the statistical and functional flows methods could also be applied to identify and balance the most critical functional flow elements with the biological and ecological functions and requirements on the NF Kern, and thereby inform an ideal functional flow regime for this riverscape.

Overall, the disparate methods analyzed in this report do have significant application globally, and all agree in their portrayal of a significantly underwatered Wild and Scenic North Fork Kern below Fairview Dam, for which more modern and environmentally aware hydropower mitigation is strongly recommended.

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Appendix A

Using the methodology presented in CEFWG (2021) and the data provided via the CEFWG Database (2021) and Zimmerman (2021), a functional flow metrics table was generated for the NF Kern River. An additional column was added to map the current MIF regime values to the flow components for comparison.

Location of Interest (LOI) = Kern River COMID: 14972877 NF Kern River between Camp Owens and Kernville			
Flow Component	**Flow Metric**	**Predicted Range at LOI median (10th - 90th percentile)**	**Current MIF regime in NF Kern in diverted stretch**
Fall pulse flow	magnitude	510 (213 - 1250) cfs	40 (40 - 650) cfs
	timing	Nov 14 (Oct 5 - Dec 2)	only present if incoming pulse > 600cfs
	duration	3 (2-7) days	reduced
Wet-season baseflow	magnitude	464 (198 - 605) cfs	100-130 cfs
	timing	Feb 7 (Jan 18 - Mar 26)	April - September
	duration	124 (60-146) days	182
Wet-season peak flows (2 yr flood)	magnitude	2930 (1880 - 10000) cfs	2330 (1280-9400) cfs
	duration	63 (1-47) days	reduced
	frequency	6 (1-5) occur	reduced
Spring recession flow	magnitude	2440 (1400 - 5250) cfs	1850 (800 - 4650) cfs
	timing	June 11 (May 21 - June 25)	earlier
	duration	78.5 (49-104) days	reduced
	rate of change	4.12 (4.27 - 8.94) %	~
Dry-season baseflow	baseflow	228 (67 - 382) cfs	40-80 cfs
	timing	Aug 25 (Jun 23 - Sept 14)	October - March
	duration	168 (149 - 236) days	182

Box plots can be generated for each of the functional flow components as described in the CEFF (CEFWG, 2021). When doing so, box plots were generated which show whiskers from 10th - 90th percentile as well as median values. 25th and 75th percentile box lines were interpolated from the available data.

The median values for three of the measures (fall pulse magnitude, wet season base flow, and dry season base flow) falls outside of the 10th to 90th percentile range, suggesting that the current regime is likely altered in the negative direction (Fig. A1).

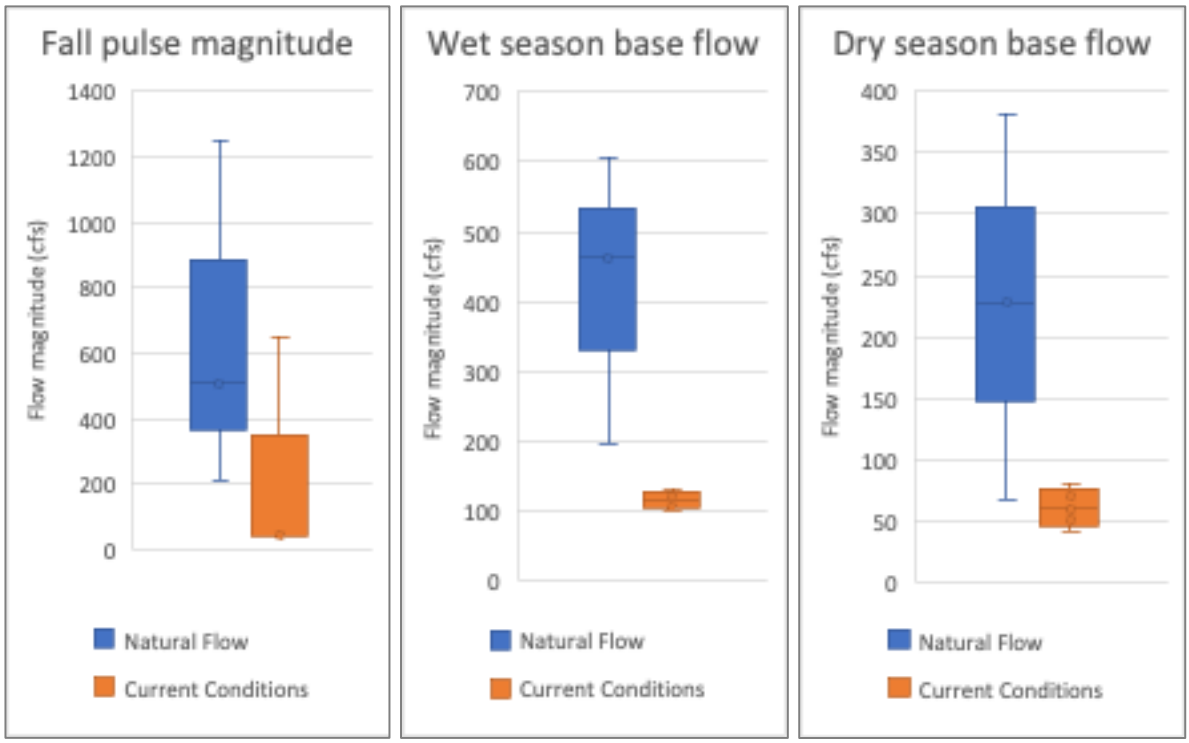


Figure A1: Comparing the "Likely Altered" Natural Flow and Current Conditions of NF Kern.

The median values for the remaining two measures (wet season peak flow (2yr flood) and spring recession flow) are not significantly altered (Fig. A2). This matches with the nature of the diversion scheme, as these measures are both capturing high water characterizations, and due to the 600cfs limitation on what the diversion can remove these are not impacted in the same way as the low water characterizations are.

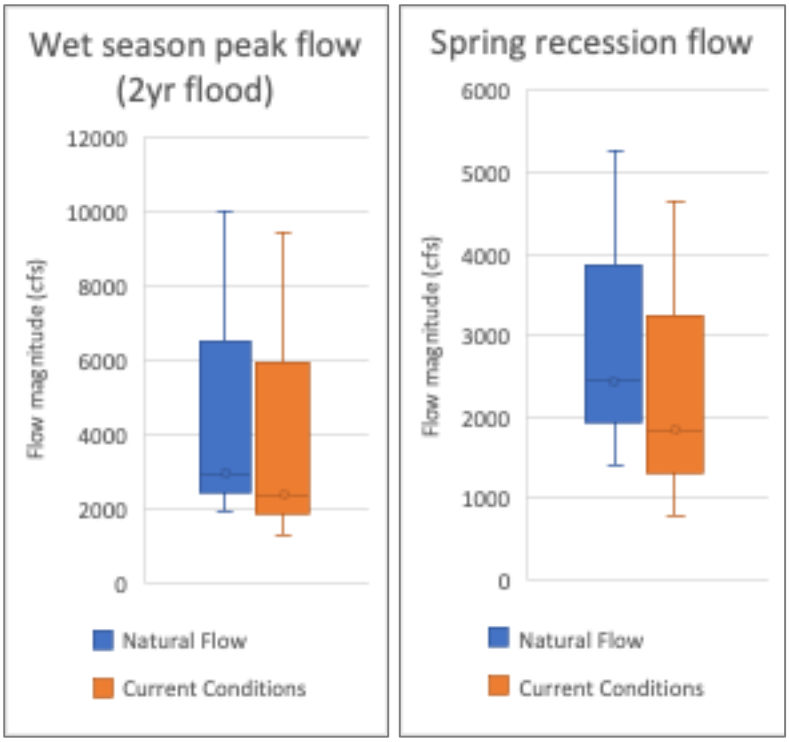
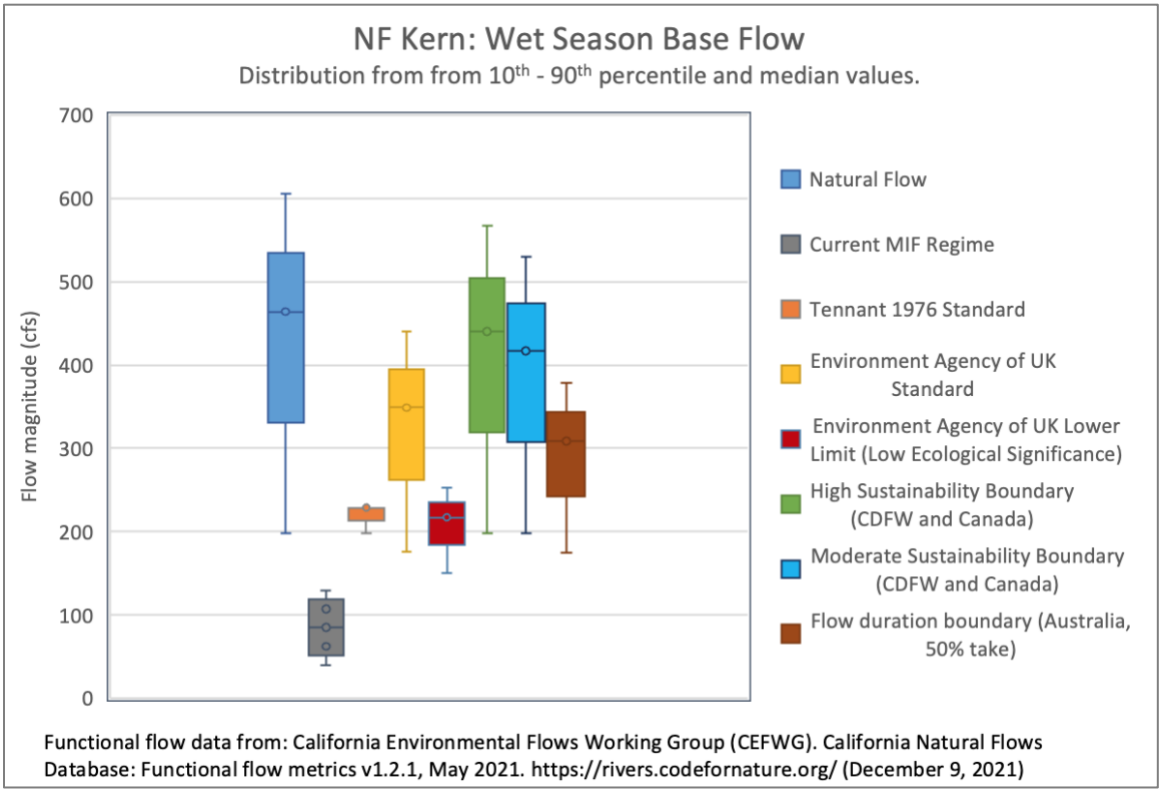


Figure A2: Comparing the "Likely Unaltered" Natural Flow and Current Conditions of NF Kern.

Finally, these functional flow "base flow" metrics for both dry- and wet- season can be compared to the international standard methods analyzed in body of this document which provide low flow threshold and flow variability recommendations (see Methods Table, above in text). For this comparison, a 50% POF take above threshold was assigned to capture the flow variability protection for the "Flow duration boundary" method. Note that this 50% POF take also matches the current guidance (not followed by current license) from the USFS SQF Federal Land Resource Management Plan (1988) for the NF Kern River. For each of the included methods, the incoming Natural Flow distribution values were subjected to the terms of each of the environmental flow protection methods, and the resulting recommended flow ranges in the diverted stretch for each method are also plotted. Results can be seen in Fig. A3.

The Current MIF Regime is significantly out of line not only with the Natural Functional Flow characterization, but also with every one of the recommendation sets, for both the wet season base flow and dry season base flow. For the wet season base flow, no part of the Current distribution even reaches the lowest recommended base flow range. The distribution of dry season base flow in the Current MIF Regime at least shares some overlap in distribution, but the median value is still significantly different and below the entirety of each recommendation's range.

Plotting in this way concisely captures not only the low flow limit but also the distribution of instream flow magnitudes, and further supports the conclusion that the Current MIF Regime for the NF Kern is significantly underwatering the river and lacks the features required for environmental and ecological protection.



Functional flow data from: California Environmental Flows Working Group (CEFWG). California Natural Flows Database: Functional flow metrics v1.2.1, May 2021. https://rivers.codefornature.org/ (December 9, 2021)

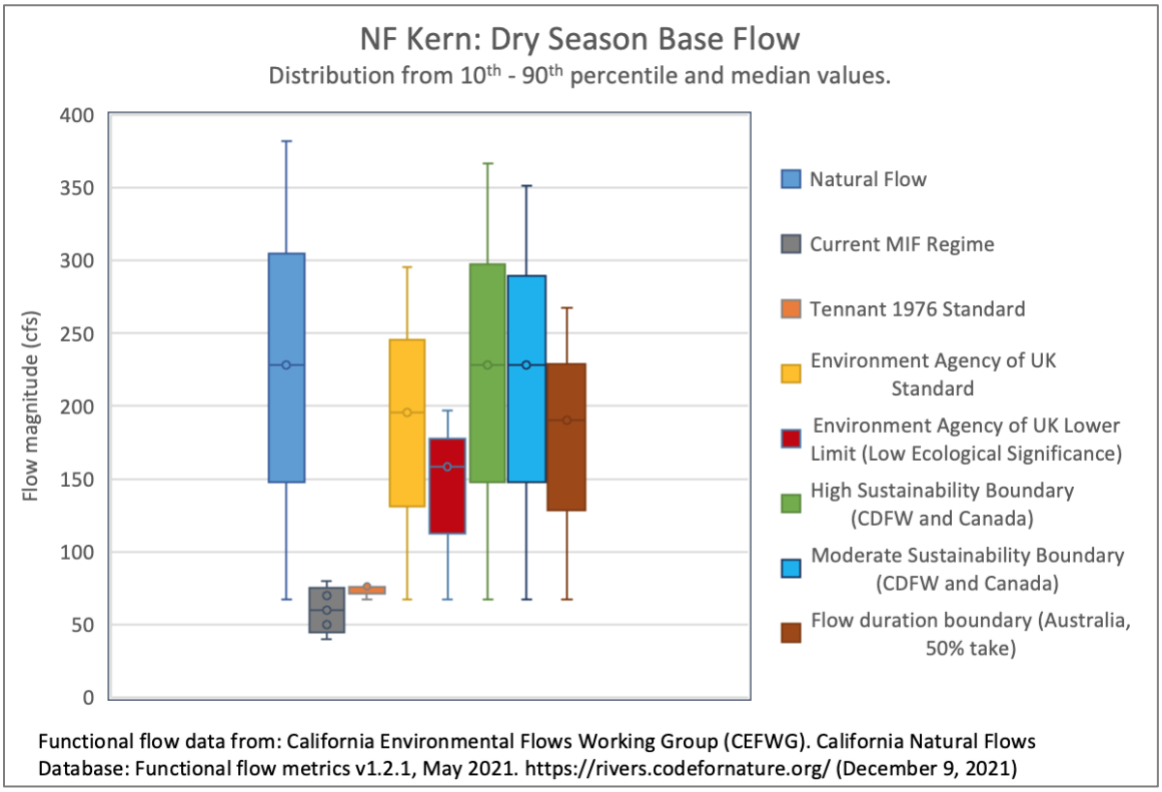


Figure A3: Comparison of environmental flow recommendations for (a) Wet season base flow and (b) Dry Season base flow functional flow components.

VII • Submitted By Kern River Boaters

This document was generated through engagement with and consideration of the Directors of Kern River Boaters, its Relicensing Committee, the KRB membership group, conservationists, and countless seasonal, travelling, local, weekender, old, new, and wayward whitewater recreators, all of whom deeply love the Wild and Scenic North Fork Kern.

Respectfully submitted,

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DATED: January 20, 2022

Figure 62: KR3 Conveyance Dry, Natural Flows Over Dam (2014)