BAY AREA COUNCIL ECONOMIC INSTITUTE

The Economic Benefits of Removing the Potter Valley Project Dams

February 2023

Introduction and Summary Findings

The Potter Valley Project is a hydroelectric facility constructed in the upper Eel River watershed approximately 20 miles northeast of Ukiah. The Project owner, Pacific Gas and Electric (PG&E), is currently working to surrender its federal license to operate the Project and decommission the facilities. PG&E has noted that the Project is uneconomic for their ratepayers as their reason for divesting from it. It is estimated that PG&E loses an average of $5-10 million per year on Project operations. Prior to moving to surrender its license for the Project, PG&E attempted to auction the facilities, but was unable to find a suitable buyer. Additionally, the facilities lack modern fish passage mechanisms, generate very little electricity by modern standards and would likely be prohibitively expensive to retrofit.

PG&E is currently deciding how to decommission the Project. Two key elements that they must face are how to comply with state and federal environmental laws, and how to limit their liability for any long term or ongoing costs associated with the Project footprint.

The Potter Valley Project consists of two 100-year-old dams – Scott Dam and Cape Horn Dam, a diversion tunnel, penstocks and a powerhouse located in the East Branch of the Russian River. The Project functions as a trans-basin diversion, moving water from the Eel River into the East Branch of the Russian River.

Scott Dam, the upper dam, has no fish passage facility and blocks 288 miles of potential spawning and rearing habitat for the Eel River's salmon and steelhead populations, both of which are listed as threatened under the Endangered Species Act. Cape Horn Dam, located 12 miles downstream from Scott Dam, has inadequate fish passage facilities, which will likely require costly upgrades to meet environmental standards. The power generation facility is currently inoperable due to an equipment failure. The Project is also under scrutiny for diverting Eel River water, which represents an adjudicated water right for the Round Valley Indian Tribes.

In 2018, Congressman Jared Huffman convened a diverse set of stakeholders in a collaborative process that sought to explore terms for the future of the Potter Valley Project. This effort, dubbed the Two-Basin Solution, sought to reduce conflict between stakeholders and work toward a compromise solution that would benefit both the Russian River and the Eel River watersheds.

Five of the participants of the Congressman's stakeholder group – Round Valley Indian Tribes, Humboldt County, Mendocino County Inland Water and Power Commission, Sonoma County Water Agency, and California Trout – then commissioned several studies exploring various alternatives and their estimated costs. Information from the group's alternatives analysis narrowed their efforts to acquiring key components of the Potter Valley Project from PG&E and modifying them to function as a water diversion-only facility, including estimating the cost of modifications and operations and additional analysis on removing both Scott Dam and Cape Horn Dam.[1]

While negotiations surrounding the fate of the Potter Valley Project continue, this report seeks to provide an understanding of the economic impacts associated with one likely result of the decommissioning process: that PG&E will remove both Scott and Cape Horn Dams. This outcome is likely due to the reasonable initial capital outlay and the minimal long-term operation and maintenance costs associated with dam removal relative to long-term operations and maintenance costs coupled with ongoing state and federal liabilities surrounding fish passage, environmental compliance, and dam safety without a continued revenue source.

Dam removal entails dismantling the dams either completely (in the case of Scott Dam) or through

modifications such as lowering (in the case of Cape Horn Dam). In both instances, fish passage would be dramatically improved compared to the status quo, significantly increasing the quantity and quality of fish habitat in the Eel River. Removal of both dams and the modernization of associated watershed infrastructure will also benefit residents, visitors, and Tribes who depend on the Eel River and Russian River for water supplies, flood protection, and recreation.

The chart below summarizes the potential economic impacts of the combined dam removal projects in the State of California, as analyzed within this report.

In total, feasibility studies show between $133 million and $185 million will need to be invested to remove Scott Dam and Cape Horn Dam. These investments will yield an economic multiplier of 1.88x across California, and they will support a total of 9.0 jobs for every million dollars spent. Key results of the analysis include the following:

- The dam removal projects would support 1,223 to 1,637 full-time equivalent job-years in the State of California, 1,037 to 1,332 of which would be within the five-county Northern California area of study.
- In addition to jobs, the dam removal and river restoration projects would provide an estimated $252 million to $345 million in total economic output for California, $203 million to $278 million of which would stay in the five-county region of study.

The economic output figure indicates the total value of transactions that are generated as a result of one dollar of initial expenditure. The multiplier effect grows as the geography studied gets larger—this pattern is typical as larger geographies have less spending leakage to other surrounding areas. As a state with a diverse set of industries and a large labor pool, the California model has very limited immediate leakage to other states. The model assumes that all of the project's initial capital and labor inputs come from within California. The full methodology is explained in the following section.

California Statewide Economic Impacts of Potter Valley Dam Removals

Project Component	Total Spending (millions in 2021 dollars)		Economic Output (millions)		Employment (Full-time equivalent job-years)	
	Low Bound	High Bound	Low Bound	High Bound	Low Bound	High Bound
Scott Dam	$105.97	$118.13	$199.81	$219.56	977	1,062
Cape Horn Dam	$27.51	$66.50	$51.90	$125.51	246	575
TOTAL IMPACT	**$133.48**	**$184.63**	**$251.71**	**$345.07**	**1,223**	**1,637**

Analysis: Bay Area Council Economic Institute using IMPLAN

Methodology

This analysis quantifies the job creation and total economic output of the removal of both dams that make up the Potter Valley Project. The project in total is currently estimated to cost between $133 million and $185 million in 2021 dollars (detailed in Appendix A), based on current estimates from project consultants. All results are stated as 2021 present value equivalents.

Economic impact is commonly measured through an input-output model that relies on national data to quantify the relationship between industries, their suppliers, and their customers. This report uses the IMPLAN modeling system to estimate the economic impacts on a five-county Northern California region (see below for definition) and the State of California using 2019 industry, transaction, and wage data and cost estimates using 2021 dollars (more current transaction models are not used due to the unique effects of the COVID-19 pandemic). IMPLAN examines the effect of a change in wages or employment due to an activity, and then analyzes its cumulative impact as the initial spending flows through the economy.

For the purposes of this report, the key outputs of the IMPLAN model are:

Employment: This measure captures the number of full-time equivalent job-years produced. For example, two 40-hour-per-week jobs that each last for six months would result in one full-time equivalent job-year in the model. Similarly, two 40-hour-per-week jobs lasting two years each would result in four full-time equivalent job-years (or four full-year equivalent jobs). The following table summarizes the concept of a full-time equivalent job-year through several examples that all equal a total of four full-time equivalent job-years:

Project components with spending activities that typically employ lower-wage workers tend to have higher job creation multipliers, while industries with higher-wage workers have a lower employment impact per dollar spent. For example, a given amount of spending might support one full-time equivalent job-year for an engineering design consultant, while that same amount of spending is likely to support multiple full-time equivalent job-years for an hourly worker employed as a revegetation field technician.

Full-time equivalent job-years	Jobs Calculation
4	One 40-hour-per-week full-time job each lasting four years
4	Two 40-hour-per-week full-time job each lasting two years
4	Four 40-hour-per-week full-time job each lasting one year
4	Eight 40-hour-per-week full-time job each lasting six months
4	Eight 20-hour-per-week full-time job each lasting one year

Economic Output: The measure of total economic activity related to the initial activity, reflecting the total spending by firms, organizations, and households that is made possible by the initial input. Economic output counts the total value of all transactions that can be traced back to the original expenditure until those dollars leave the geography, are saved by households, or become profit for businesses.

These two economic impacts are each broken down further as direct, indirect, or induced effects:

- The direct effects derive from the initial project-related investment. For example, the hiring of a construction contractor and the subsequent wages paid to an equipment operator are direct effects. Direct effects are generally equivalent to total project costs.
- The indirect effects are the transactions that flow from the areas of initial spending—for example, construction companies hired to remove a dam will need to purchase equipment or materials.

- Lastly, the model generates induced impacts, which derive from spending created by the wages related to the initial activity. In this example, as construction workers spend their wages, they create impacts in restaurants, retail, the healthcare system, and in other sectors.

Regional and Statewide Impacts: Two geographies were defined to assess the impact on the regional and statewide economy. The statewide economy is defined as the 58 counties in the state. The regional economy refers to a five-county Northern California region, including Humboldt, Lake, Marin, Mendocino, and Sonoma counties. The Potter Valley Project infrastructure spans Lake and Mendocino counties, thus construction-related impacts are concentrated in these two counties. Given that the dams' removal will have ancillary water reliability, recreation, and fishery impacts in both the Eel River and Russian River basins, Humboldt, Sonoma, and Marin counties are also included in the economic model.

Higher indirect and induced impacts for the larger geographies reflect how initial spending in the local economy expands across the regional and statewide economy—creating both jobs and output in local-serving industries such as food service, entertainment, retail, and healthcare. For example, if construction workers employed by one of the contractors live within the region and spend most of their wages in their home counties, this impact is captured in the regional model. Alternatively, the California model reflects those same impacts of earnings circulating in the economy on a statewide scale; therefore, the California model will produce larger figures for indirect and induced impact.

To build an IMPLAN model, numerous assumptions must be made as to how the expenditures are initially made. Most significantly, each analysis must assign investment values to industries.

For each project component, industries that reflect the activities were selected and spending allocations were assigned to each industry based on expenditure breakdowns from project feasibility studies. The mix of spending—including the wages and capital expenditures associated with each industry—determines each component's job production potential and economic output. Because no specific demolition and construction timelines are in place, this analysis uses cost estimates that were derived using 2021 dollars.

Van Arsdale Reservoir

Economic Impact Detail

The economic impact analysis leans heavily on the November 2021 Potter Valley Feasibility Study prepared by McMillen Jacobs Associates. All figures used to estimate the economic impacts of the full or partial removal of Scott Dam and Cape Horn Dam are taken from this document. The feasibility study details numerous options that would ensure upstream and downstream fish passage on the Eel River, while maintaining water reliability in the Russian River watershed. Importantly, it also provides cost estimates for the various alternatives analyzed. These cost estimates are used as the primary input for the economic impact modeling exercise. Some alternatives on Cape Horn Dam include ongoing operations and maintenance expenses. These costs are not included in the modeling, which aggregates only capital expenditures.

Models were run that capture the economic impacts of the projects at a regional scale and statewide scale. For the purposes of this modeling, the region is defined as Humboldt, Lake, Marin, Medocino, and Sonoma counties. The statewide model is inclusive of the five-county region, thus impacts will be larger across California.

The sections that follow provide economic impact modeling results for all full and partial dam removal alternatives of the Scott and Cape Horn dams. Of note, a less extensive alternative at the Cape Horn Dam/ Van Arsdale Reservoir—an updated fish ladder—is not analyzed here.

1. Scott Dam / Lake Pillsbury

Total Estimated Spending for Removal of Scott Dam: $106 - $118 million

Background: Located near the headwaters of the Eel River watershed, Scott Dam is a concrete gravity dam that impounds Lake Pillsbury and was originally constructed to provide water storage for the hydroelectric plant located in Potter Valley so that better balancing of power production throughout the year could be achieved. Since that time, stored water has been used for additional beneficial uses, including municipal water supply to downstream users in the Russian River Basin and irrigation water supply for the Potter Valley Irrigation District. The dam does not include provisions for fish passage, and therefore represents a total fish passage barrier to the Eel River headwaters.

Alternative 1 – Rapid Removal

The rapid removal approach includes full decommissioning and removal of the Scott Dam with a rapid release of accumulated sediment from the reservoir during a single high flow season. The concept for the rapid removal approach involves four main steps:

1. Drill a tunnel through the base of the spillway, leaving a plug intact at the upstream terminus of the tunnel;
2. Lower the dam and reservoir during the low flow season with controlled water releases;
3. Open the tunnel plug and release impounded sediments during a single high flow season; and
4. Complete dam removal and channel rehabilitation during the following low flow season.

The rapid removal approach has an estimated median cost of $106 million, which includes the price of construction, taxes, overhead, and contingency.

Alternative 2 – Phased Removal

Phased removal of Scott Dam would draw the reservoir down and flush sediment more gradually over a series of high flow seasons. The phased removal approach described in the feasibility study assumes four high-flow seasons as outlined below:

1. Remove the dam crest, lower the dam and reservoir during the low flow season using controlled releases, and construct a spillway notch to pass high flows;

2. Through three high-flow and low-flow seasons, successively lower and notch the dam to gradually evacuate sediment and drain the reservoir; and

3. Complete dam removal and channel rehabilitation during the final (fourth) low-flow season

The phased removal approach has an estimated median cost of $118 million, which includes the price of construction, taxes, overhead, and contingency.

Regional Economic Impacts

To calculate a total economic impact, the costs for each alternative were allocated into various spending buckets based on the cost estimates provided in the feasibility study and expenditure totals from other dam removal studies.

The rapid removal approach is estimated to produce $161 million in economic benefit over the duration of the removal project at the five-county regional level. This level of spending will directly support 518 full-time equivalent job-years within the region and an additional 313 jobs through supply chain effects and the employee spending multipliers. In total, the rapid removal of Scott Dam is estimated to support 831 full-time equivalent job-years.

The phased removal approach is estimated to produce a larger $179 million in economic benefit at the five-county level—a product of the higher spending level. The phased removal approach will support a total of 907 full-time equivalent job-years as highlighted in the charts below.

Regional Economic Impact: Scott Dam Removal

Economic Output (Millions)				
	Direct Impact	Indirect Impact	Induced Impact	**Total**
Rapid Removal	$105.97	$26.04	$29.44	**$161.46**
Phased Removal	$118.13	$26.08	$32.15	**$178.89**

Analysis: Bay Area Council Economic Institute using IMPLAN

Notes: Region includes Humboldt, Lake, Marin, Mendocino, Humboldt, and Sonoma counties

Regional Employment Impact: Scott Dam Removal

Employment (Full-time equivalent job-years)				
	Direct Jobs	Indirect Jobs	Induced Jobs	**Total**
Rapid Removal	518	144	169	**831**
Phased Removal	563	160	184	**907**

Analysis: Bay Area Council Economic Institute using IMPLAN

Notes: Region includes Humboldt, Lake, Marin, Mendocino, Humboldt, and Sonoma counties

Statewide Impacts

The economic impacts of removing Scott Dam are greater across the State of California given that spending leakage outside the area of study is less likely. At the regional level, a construction worker may live outside of the region and spend their earnings outside the study area. This is less of a concern in the statewide model and the major reason why its multiplier effects are higher than in the regional model.

The rapid removal approach is estimated to produce a statewide economic impact of $200 million over the course of the project. The level of economic output will support nearly 1,000 full-time equivalent job-years across the state, including 518 job-years directly involved with removal of the dam.

The phased removal approach is estimated to produce a statewide economic impact of $220 million. Nearly 500 full-time equivalent job-years will be supported outside of the direct removal of the dam—these impacts stem from investments made by companies within the dam removal supply chain and from employees spending their money in the statewide economy. In total, the phased removal approach is estimated to support 1,062 full-time equivalent job-years in California.

California Economic Impact: Scott Dam Removal

Economic Output (Millions)				
	Direct Impact	Indirect Impact	Induced Impact	**Total**
Rapid Removal	$105.97	$42.11	$51.72	**$199.81**
Phased Removal	$118.13	$45.24	$56.18	**$219.56**

Analysis: Bay Area Council Economic Institute using IMPLAN

California Employment Impact: Scott Dam Removal

Employment (Full-time equivalent job-years)				
	Direct Jobs	Indirect Jobs	Induced Jobs	**Total**
Rapid Removal	518	190	269	**977**
Phased Removal	563	207	292	**1,062**

Analysis: Bay Area Council Economic Institute using IMPLAN

2. Cape Horn Dam / Van Arsdale Diversion

Total Estimated Spending for Removal of Cape Horn Dam: $28 - $66 million

Background: Located approximately 12 miles downstream of Scott Dam, Cape Horn Dam is a concrete gravity and earthfill dam that operates as a run-of-river diversion, with inflow passing over the crest of the spillway-type dam crest with a very small amount of attenuation or storage. The dam includes a fish passage facility located on the left bank. The dam was designed to provide adequate submergence on the diversion tunnel, which extends from just upstream of Cape Horn Dam and through the basin divide, terminating at the powerhouse located at the north end of Potter Valley. The diversion consists of several lengths of tunnel with a combined tunnel length of over 1 mile. Water diverted from the Eel River basin to the Russian River basin flows through the Van Arsdale Diversion.

Alternative 1 – Control Section and Pump Station

This alternative entails partial dam removal by lowering a section of the concrete gravity portion of Cape Horn Dam to create a control section. The control section would help ensure adequate flow depths at low flow, while an upper portion would provide adequate flow area for high flows. In total, the control section would be approximately 100 feet long and would pass all Eel River flows, except for those diverted. The section of dam lowered in elevation would marry up with a new reinforced concrete pump station with a series of vertical cylindrical screens mounted to the outside face. The pump station would be between 90 and 100 feet long in the river flow direction and approximately 15 to 25 feet wide. The new intake pump station would convey pumped water to the existing Van Arsdale Diversion facility. The lowering of the dam and the development of a natural channel upstream also eliminates the need for a fish ladder.

This alternative has a total cost of $28 million, as estimated in the project feasibility study.

Alternative 2 – Roughened Channel with Gravity Supply

This alternative would include lowering the entire concrete gravity portion of Cape Horn Dam. Roughly 100 feet downstream of the dam, the fish hotel and exclusion barrier would also be lowered. Between the downstream bedrock control and the fish hotel/exclusion barrier a roughened channel is proposed. The roughened channel would resemble a boulder cascade, with very large rock material providing channel stability sufficient to withstand extreme high flow events and to support fish passage. A similar roughened channel would extend upstream of the dam approximately 420 feet. The conveyance of water to Potter Valley would remain unchanged under this alternative.

This alternative has a total cost of $49 million, as estimated in the project feasibility study.

Alternative 3 – Upstream Diversion with Gravity Supply

This alternative would include removing the entire concrete gravity portion of Cape Horn Dam down to bedrock and lowering or removing the earthen embankment portion of the dam. The existing fish hotel, exclusion barrier, and fish ladder would also be removed. An inflatable bladder weir would be installed across the Eel River approximately 2,000 feet upstream of the dam. The weir would connect on river left to an intake forebay, which would screen fish and debris. Conveyance infrastructure would then connect the forebay to the existing Van Arsdale Diversion.

This alternative has a total cost of $66 million, as estimated in the project feasibility study.

Regional Economic Impacts

As detailed in the tables below, the three alternatives analyzed for the Cape Horn Dam yield a range of impact results. For the purposes of modelling, total spending estimates for each alternative were divided into specific actions (e.g., construction, environmental and technical work, and specialized design) based on research from similar previously-completed projects.

At the low end of the impact spectrum, the control

section and pump station alternative yields an economic output of just over $40 million at the five-county regional level. Given its higher costs, the upstream diversion alternative produces nearly $100 million of total economic impact at the regional level.

Cape Horn Dam removal would support between 128 and 292 direct full-time equivalent job-years within the five counties. Inclusive of these jobs and all multiplying effects of the spending, between 207 and 476 full-time equivalent job-years would be supported in the region.

Regional Economic Impact: Cape Horn Dam

Economic Output (Millions)				
	Direct Impact	Indirect Impact	Induced Impact	**Total**
Control & Pump	$27.51	$6.86	$7.22	**$41.60**
Roughened Channel	$48.64	$11.69	$12.42	**$72.75**
Upstream Diversion	$66.24	$16.83	$16.41	**$99.48**

Analysis: Bay Area Council Economic Institute using IMPLAN

Notes: Region includes Humboldt, Lake, Marin, Mendocino, and Sonoma counties

Regional Employment Impact: Cape Horn Dam

Employment (Full-time equivalent job-years)				
	Direct Jobs	Indirect Jobs	Induced Jobs	**Total**
Control & Pump	128	37	41	**207**
Roughened Channel	213	64	71	**348**
Upstream Diversion	292	90	94	**476**

Analysis: Bay Area Council Economic Institute using IMPLAN

Notes: Region includes Humboldt, Lake, Marin, Mendocino, and Sonoma counties

Statewide Economic Impacts

At the state level, the economic impacts of removing the Cape Horn Dam are slightly larger than those presented for the region. There are spillover effects from spending and contracting that will occur outside the regional area of study—those impacts are captured here in the California model.

Total economic output in California will move upward by between $52 million and $125 million depending on the chosen alternative for removing the Cape Horn Dam.

These results represent economic multiplier effects of between 1.84x and 1.89x the original expenditure levels.

The alternatives proposed at the Cape Horn Dam will yield 246 new full-time equivalent job-years in California if the control section and pump station alternative is pursued. A higher estimate of 575 new full-time equivalent job-years supported in California is possible under the upstream diversion with gravity supply alternative.

California Economic Impact: Cape Horn Dam

Economic Output (Millions)				
	Direct Impact	Indirect Impact	Induced Impact	**Total**
Control & Pump	$27.51	$11.49	$12.90	**$51.90**
Roughened Channel	$48.64	$19.18	$21.90	**$89.71**
Upstream Diversion	$66.24	$29.33	$29.94	**$125.51**

Analysis: Bay Area Council Economic Institute using IMPLAN

California Employment Impact: Cape Horn Dam

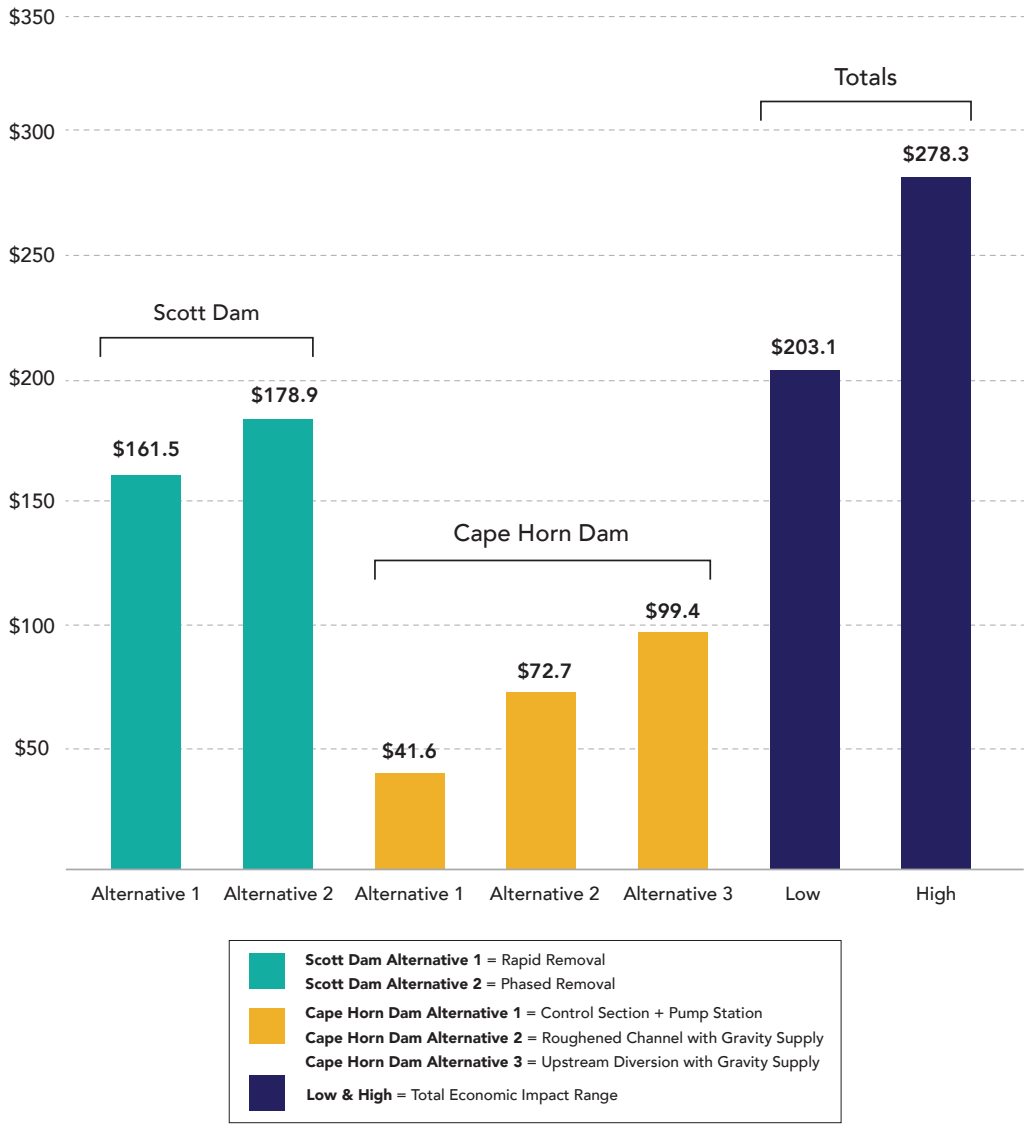
Employment (Full-time equivalent job-years)				
	Direct Jobs	Indirect Jobs	Induced Jobs	**Total**
Control & Pump	128	51	67	**246**
Roughened Channel	213	86	114	**413**
Upstream Diversion	292	127	156	**575**

Analysis: Bay Area Council Economic Institute using IMPLAN

Total Economic Impacts

By combining the economic models for the removal of Scott Dam and Cape Horn Dam, a full picture of the impacts stemming from the restoration of the Eel River can be achieved. Below, the impacts are presented in charts that highlight employment and economic impacts in both the five-county region area of study and the entire state. At the high end, approximately $345 million in economic output and over 1,600 full-time equivalent job-years would be supported in California through removal of the two dams.

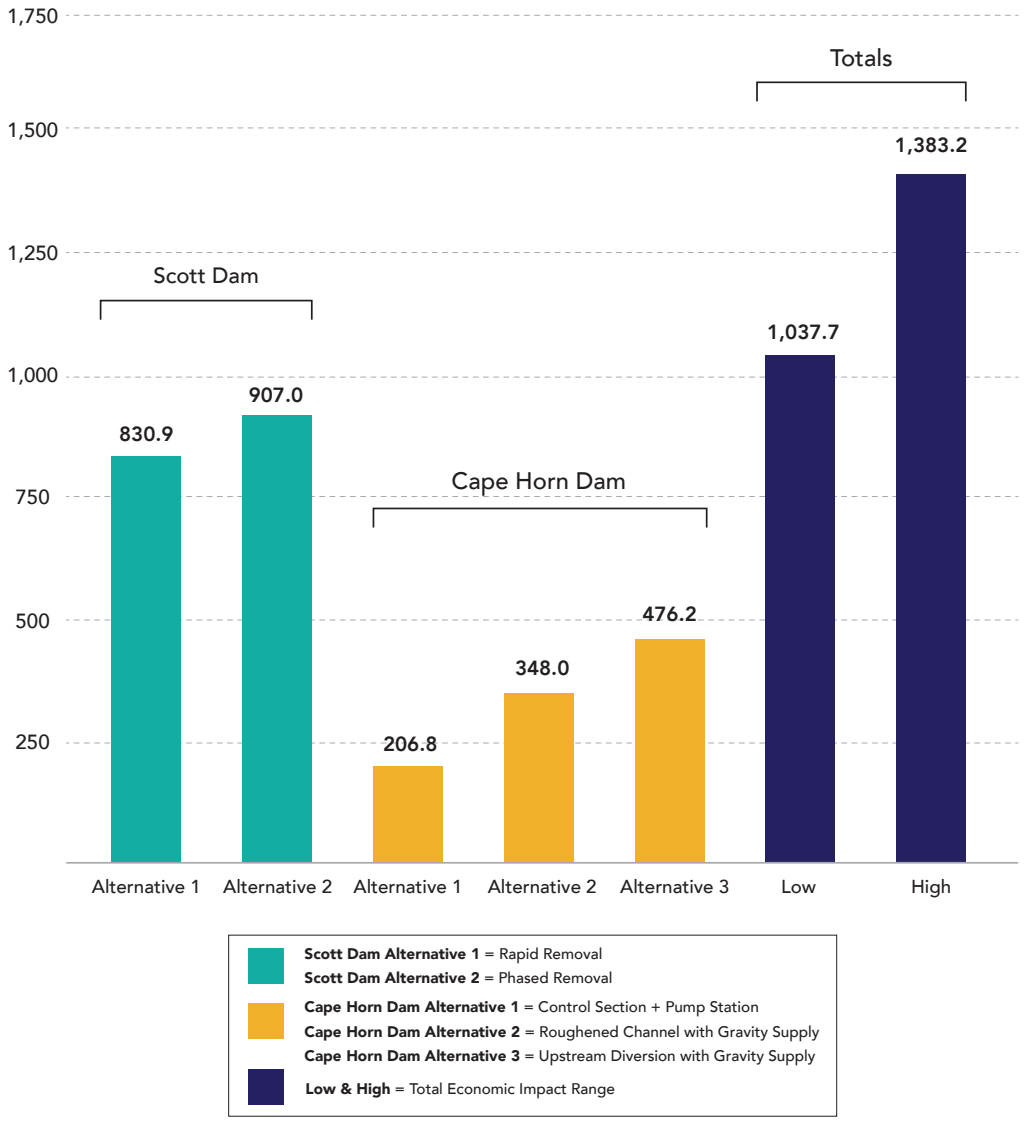
Total Economic Impacts at the Regional Level (in Millions)
(Humbolt, Lake, Marin, Mendocino, and Sonoma Counties)



Analysis: Bay Area Council Economic Institute using IMPLAN

Total Employment Impacts at the Regional Level

(Full-time Equivalent Job Years in Humbolt, Lake, Marin, Mendocino, and Sonoma Counties)



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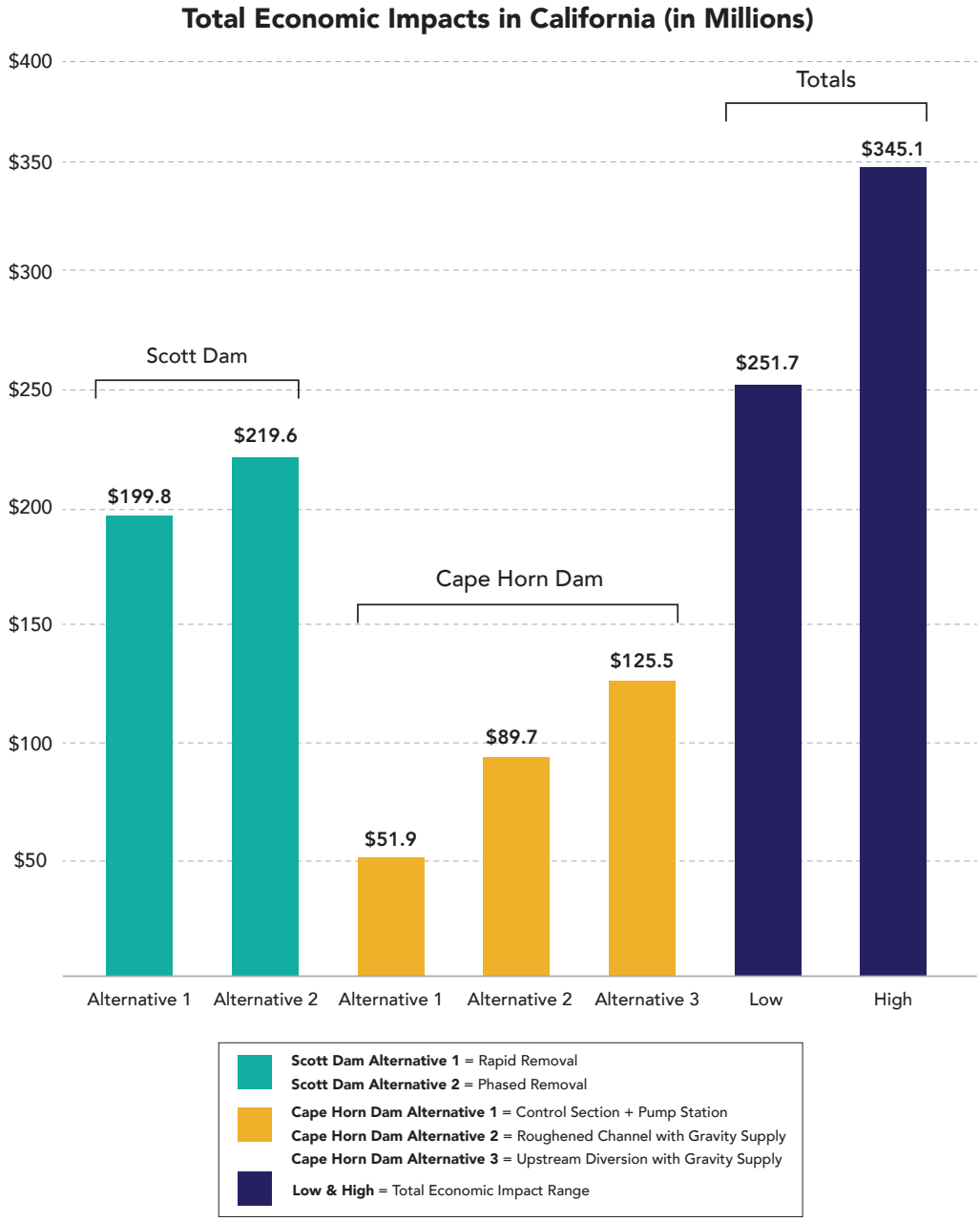
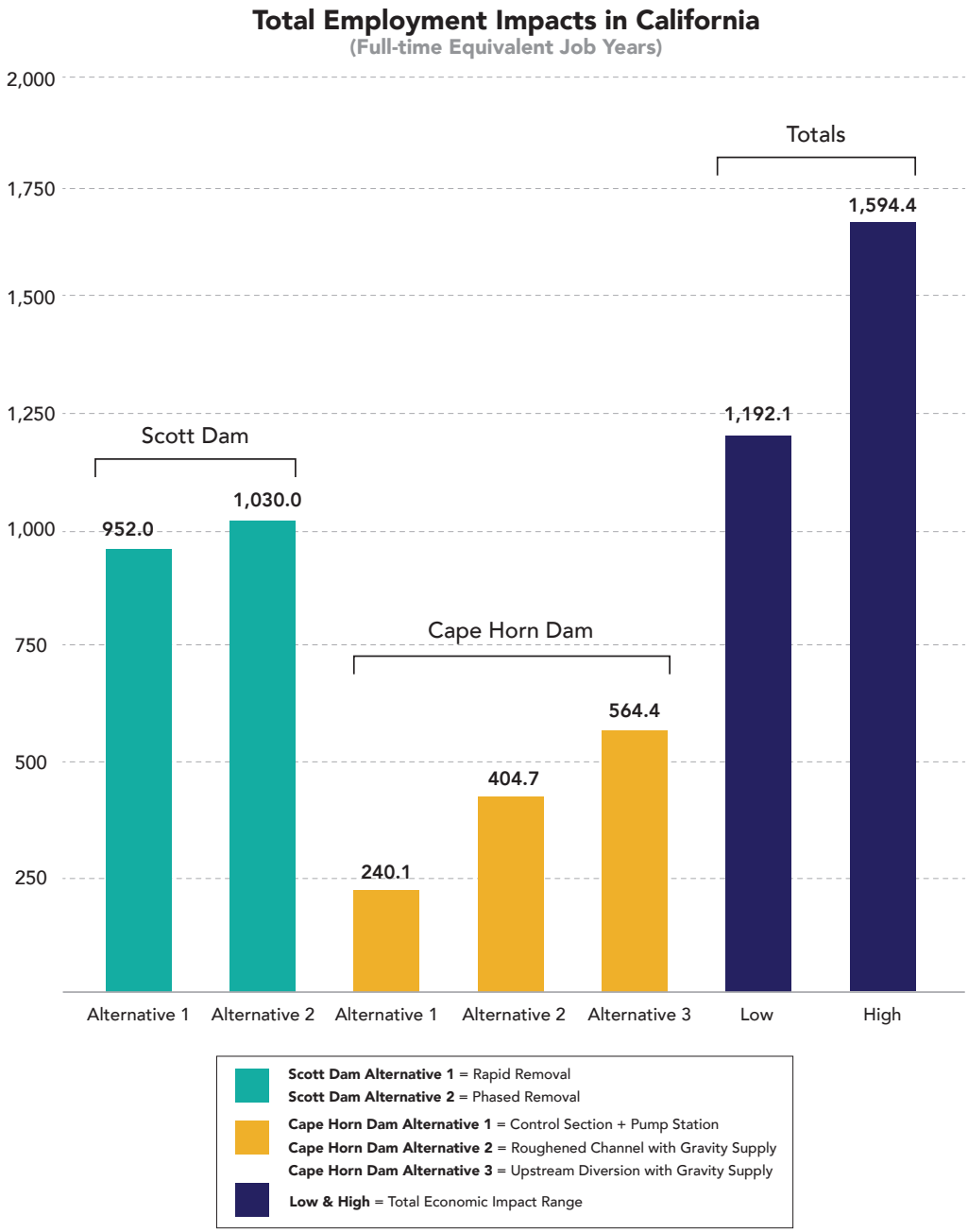


Analysis: Bay Area Council Economic Institute using IMPLAN



Analysis: Bay Area Council Economic Institute using IMPLAN

Non-quantifiable Benefits

The Eel River once boasted some of the largest salmon runs in California with an estimated 500,000 salmonids returning annually prior to the 20th century.[2] Today, the Eel River sees less than 10,000 salmonids returning annually, meaning the river has experienced a 97% drop in population over the last century. Currently, Eel River salmon and steelhead populations are listed as threatened species. Not only are the Eel River's fish populations depressed, but the river's main stem and estuary are being negatively affected by habitat loss from agriculture, non-native fish introduction, and impaired water quality.[3] By reconnecting the headwater habitats to the lower river, fish populations are likely to increase and present new opportunities for commercial and recreational fishing in the region.

While this study does not seek to quantify the economic benefits associated with an improved salmon fishery in the Eel River basin, a previous study from 20 years ago estimated economic benefits of more than $5 million annually to the region.[4] Inflated to 2022 dollars, that figure would stand at over $8 million annually today. However, that level of economic impact relies on recovery of the salmon population and economic development strategies to further develop the fishing and tourism industries in the region—neither of which are modeled here.

Following dam removal there are quantifiable short- and long-term responses from the fish populations and river environment. Short-term responses are largely associated with the immediate impact of sediment release and uninterrupted migratory pathways. Long-term responses involve the river ecosystem finding new equilibriums following removal.[5] The ecosystems that take shape following dam removal may not be like their pre-dam predecessors due to sediment and population changes. However, previous dam removals demonstrate promising results for the recovery of native fish populations and nearby economies.

The removal of two smaller dams and fish passage improvements on the Penobscot River in Maine restored 2,000 miles of habitat access for its native fish populations. This removal project resulted in a noticeable population spike of the river's salmon population. In 2014, there were only 248 salmon that returned to the river, as compared to 2022 during which 1,426 salmon returned. Similar responses have been recorded following other dam removal projects, like in Olympic National Park. The removal of two large dams on the Elwha River in Olympic National Park restored 75% of the previously inaccessible spawning habitat. From 2014 to 2017, the Coho salmon smolts increased their population from 9,000 to 17,000 following the dam removal. Additionally, from 2009 to 2011 the summer steelhead population surveys along the lower Elwha River never revealed more than one or two returning fish. In 2018, this population rose to at least 300 fish.[6]

In addition to the economic benefits detailed in this analysis and the potential fishery benefits described here, there are other cultural, community, and environmental benefits that will result from the project to restore the Eel River while protecting water flows to the Russian River basin. These include increased water supply reliability for local communities and new and improved recreation access throughout the watershed. While beyond the scope of this study, these benefits are critical to consider when evaluating the full economic and environmental impacts of the projects and may be an appropriate focus of future research to quantify the value of these effects.

Conclusion

The results presented in this report show that the initial investment in removing the two dams associated with the Potter Valley Project will stimulate the regional and statewide economy through both job creation and economic output. Key findings of this study include:

- The dam removal projects support 1,223 to 1,637 full-time equivalent job-years in the State of California, 1,037 to 1,332 of which are within the five-county area of study.
- In addition to jobs, the projects provide between $252 million and $345 million in total economic output for California, between $203 million and $278 million of which would stay in the five-county region of study.

These findings show that there is a substantial economic multiplier effect derived from dam removal and associated project components, nearly doubling the initial estimates of between $133 million and $185 million in project costs.

Scott Dam Spillway

Appendix A

Scott Dam Removal Costs - Rapid Removal

Project Component	Total Spending (millions)
GC's & Mobilization	$15.94
Demolition	$46.98
Metals	$0.05
Earthwork	$1.70
Exterior Improvements	$1.50
Marine & Waterway	$2.90
Overhead	$4.14
Profit	$8.29
Construction Bonds	$2.20
Sales Tax	$5.01
Contingency	$17.27
TOTAL COST	**$105.97**

Analysis: Bay Area Council Economic Institute using IMPLAN

Scott Dam Removal Costs - Phased Removal

Project Component	Total Spending (millions)
GC's & Mobilization	$25.67
Demolition	$47.23
Metals	$0.05
Earthwork	$0.35
Exterior Improvements	$1.00
Marine & Waterway	$2.70
Overhead	$4.62
Profit	$9.24
Construction Bonds	$2.45
Sales Tax	$5.58
Contingency	$19.25
TOTAL COST	**$118.13**

Analysis: Bay Area Council Economic Institute using IMPLAN

Appendix A Continued

Cape Horn Dam Removal Costs - Alternative 1

Project Component	Total Spending (millions)
GC's & Mobilization	$3.31
Demolition	$7.00
Concrete	$3.05
Metals	$0.18
Electrical	$0.17
Instrumentation & Control	$0.14
Earthwork	$4.39
Exterior Improvements	$0.01
Marine & Waterway	$1.19
Pumps	$0.43
Overhead	$1.19
Profit	$2.38
Construction Bonds	$0.63
Sales Tax	$1.44
Contingency	$1.99
TOTAL COST	**$27.51**

Analysis: Bay Area Council Economic Institute using IMPLAN

Cape Horn Dam Removal Costs - Alternative 2

Project Component	Total Spending (millions)
GC's & Mobilization	$5.86
Demolition	$6.50
Concrete	$2.54
Metals	$0.12
Electrical	$0.05
Instrumentation & Control	$0.14
Earthwork	$4.39
Exterior Improvements	$0.01
Utilities	$0.05
Marine & Waterway	$1.19
Overhead	$2.11
Profit	$4.22
Construction Bonds	$1.12
Sales Tax	$2.55
Contingency	$3.51
TOTAL COST	**$48.64**

Analysis: Bay Area Council Economic Institute using IMPLAN

Appendix A Continued

Cape Horn Dam Removal Costs - Alternative 3

Project Component	Total Spending (millions)
GC's & Mobilization	$8.01
Demolition	$7.83
Concrete	$13.60
Metals	$0.47
Special Construction	$0.19
Electrical	$0.21
Instrumentation & Control	$0.14
Earthwork	$14.80
Exterior Improvements	$1.05
Utilities	$0.08
Marine & Waterway	$1.66
Overhead	$2.88
Profit	$5.76
Construction Bonds	$1.53
Sales Tax	$3.48
Contingency	$4.80
TOTAL COST	**$66.50**

Analysis: Bay Area Council Economic Institute using IMPLAN

Appendix B

Infrastructure Project / Study Area	Project Type	Economic Impact	Employment Impact
Klamath River, California	Dam Removal	**2.35x multiplier**: $100 million in spending results in $235 million statewide impact	21.5 jobs per $1 million spent
Lower Snake River, nine counties in Washington & Idaho	Dam Removal	**1.79x multiplier**: $789.4 million in spending results in $1.4 billion in economic output in 9-county region	12.2 job per $1 million spent
San Joaquin - Sacramento River watershed, California	Levee Improvements	**2.13x multiplier**: $170 million spent results in $362 million in economic output in California	11.2 jobs per $1 million spent
Oregon Watershed Enhancement Board Grants, statewide	Watershed Improvements	**1.90x - 2.40x mulitplier**: Calculated across multiple projects	16.3 jobs per $1 million spent
San Joaquin River, eight counties in California	Watershed Improvements	Not calculated	14.1 jobs per $1 million spent
California High-Speed Rail Initial 10 years, California	Transportation Infrastructure	**1.64x multiplier**: $3.6 billion in spending results in $5.9 billion statewide impact	9.2 jobs per $1 million spent
Multiple U.S. Department of Interior Projects, nationwide	Ecosystem Restoration	**2.20x multiplier**: Calculated across multiple projects	12.9 jobs per $1 million spent
Matilija Dam Ecosystem Restoration Project	Dam Removal	**2.10x multiplier**: Calculated across multiple projects	13.9 jobs per $1 million spent
Potter Valley Project			
Five Counties in California	Dam Removal	**1.51x multiplier**	7.6 jobs per $1 million spent
State of California		**1.88x multiplier**	8.8 jobs per $1 million spent

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About the Institute

Since 1990, the Bay Area Council Economic Institute has been a leading think tank focused on the economic and policy issues facing the San Francisco/Silicon Valley Bay Area, one of the most dynamic regions in the United States and the world's leading center for technology and innovation. A valued forum for stakeholder engagement and a respected source of information and fact-based analysis, the Institute is a trusted partner and adviser to both business leaders and government officials. Through its economic and policy research and its many partnerships, the Institute addresses major factors impacting the competitiveness, economic development, and quality of life of the region and the state, including infrastructure, globalization, science and technology, and health policy. It is guided by a Board of Trustees drawn from influential leaders in the corporate, academic, non-profit, and government sectors.

Endnotes

1. Scott Dam and Cape Horn Dam Removal Alternatives, McMillen Jacobs Associates, November 2021 http://pottervalleyproject.org/wp-content/uploads/2021/12/Scott-Dam-and-Cape-Horn-Dam-Removal.pdf
2. Historical Review of Eel River Anadromous Salmonids, with Emphasis on Chinook Salmon, Coho Salmon, and Steelhead." University of California, Davis, Center for Watershed Sciences, February 1, 2010.
3. Eel River Research Examines Dams' Effect on Salmon," https://now.humboldt.edu/news/eel-river-research-examines-dams-effect-on-salmon
4. The Center for Environmental Economic Development, "A River in the Balance: Benefits and Costs of Restoring Natural Water Flows to the Eel River." Summer 2022
5. J Ryan Bellmore et al., "Conceptualizing Ecological Responses to Dam Removal: If You Remove It, What's to Come?," Bioscience 69, no. 1 (January 1, 2019): 26–39
6. Alexander Matthews, "The Largest Dam-Removal in US History," https://www.bbc.com/future/article/20201110-the-largest-dam-removal-project-in-american-history

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Page 4: Potter Valley Feasibility Study: Capital Improvements, April 2021

Page 16: Potter Valley Feasibility Study: Capital Improvements, April 2021

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