WELLS BARNETT ASSOCIATES, LLC
Land Use Planning + Economics

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TECHNICAL WHITE PAPER

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Darcie Goodman, *The League to Save Lake Tahoe*
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RE: Economic Impact of the TRPA Environmental Improvement Program

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This Technical White Paper presents the overall conclusions and technical data for an Economic Impact Analysis prepared for the Tahoe Regional Planning Agency's (TRPA's) Environmental Improvement Program (EIP). This work is being prepared by Wells Barnett Associates (WBA Consulting) as part of an overall effort to quantify various attributes of the EIP for future administrative and legislative initiatives.

This White Paper includes a summary of key results, a detailed description of the approach and methodologies used, definitions of key terms, and all data and assumptions that were used to arrive at the results.

Summary of Results

- **Finding 1:** The EIP has been a critical tool for implementing environmental projects focused on enhancing regional environmental quality in the Lake Tahoe Basin. Over its life span beginning in 1997, EIP partners have completed approximately 700 projects and have over 300 in active implementation. **To date, the program has recorded approximately $2.5 billion in nominal direct investment, which equates to approximately $3.1 billion when adjusted for inflation (in 2020 dollars)**.

- **Finding 2:** Using an input/ output model to estimate the full spectrum of economic impacts of the EIP spending, we have found that **the program has generated $5.2 billion in total economic output since 1997 (in 2020 dollars)**. This amount includes the direct outlay spent on the program itself, and also includes indirect and induced spending on inputs, suppliers, and from additional household income spent in the local region.

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- **Finding 3**: The spending from the EIP also supports a significant number of jobs in the region. Over its lifetime beginning in 1997, **the EIP has supported approximately 37,800 jobs, representing an average of 1,700 per year**. Similar to the economic output figures described in Finding 2 above, these jobs are supported not only by the direct spending of the EIP program, but also the "spin-off" spending of suppliers, contractors, and employees.

- **Finding 4:** The EIP is likely to continue to support the local economy into the future, as the EIP partnership continues to advocate to support this program that is vital to the environmental quality of the Tahoe Basin. **This Economic Impact Analysis has found that every $1 million in EIP spending generates $1.6 million in total economic output and approximately 11.9 jobs in the Lake Tahoe Region**.

- **Finding 5**: The economic impact results noted in this analysis are inherently conservative, as they only include the spending that flows directly through the EIP, and the ancillary "spin-off" spending that it drives. Other related impacts contribute significant economic activity to the region, but are beyond the scope of this analysis and should be considered for inclusion in future studies. Such activities include the EIP's influence on tourism/ recreation, stimulation of private property redevelopment, the support of property values, the provision of safe and clean drinking water, and others.

Table 1 (below) summarizes the key economic impact figures presented in this White Paper.

Table 1
Summary of the Economic Impact of the EIP (2020 $) *

Category	Total Value	Average Annual Value
Direct Expenditures, 1997 - 2019	$3,177,606,702	$144,436,668
Total Economic Output, 1997 - 2019	$5,166,327,570	$234,833,071
Total Jobs, 1997 - 2019	37,774	1,717
Total Economic Output per $1M in Direct Expenditures	**$1,625,855**	
Total Jobs per $1M in Direct Expenditures	11.9	

Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA

* Results are based on total nominal expenditures of approximately $2.5 billion, which equates to approximately $3.1 billion in 2020 dollars when adjusted for inflation.

Methodology, Data, and Assumptions

Overall Approach and Methodology

This Economic Impact Analysis evaluates the economic value of the EIP by quantifying its impact on economic output and jobs in the Lake Tahoe Region. The primary analytical tool used to arrive at the economic impact figures presented in this analysis is the IMPLAN 2018 data and computer software by the IMPLAN Group, LLC. IMPLAN is a widely-used economic impact modeling framework which uses a complex input/output algorithm that predicts how certain economic stimuli will affect a defined geographic area.

One of the primary functions of IMPLAN is to estimate the degree to which economic activity circulates throughout a geographic area. This circulation (also referred to as "spin-off" activity or "multiplier effect") quantifies the way in which economic activity is spent and re-spent within a local or regional economy. When a business generates sales, it will use some of that income to purchase other goods and services and to hire people to meet the demand for its products and/or services. These purchases, made by the business, represent sales to other firms who must then also purchase goods and services and hire people to meet their new demand, and so on.

In this study, we have measured the spending on EIP projects and programs aimed at enhancing regional environmental quality, such as on the construction of a stormwater detention basin. It also quantifies the spending of a subcontractor who is hired to assist with the stormwater project, as well as all materials, supplies, equipment rentals and other inputs that are necessary to complete the project. Finally, it will count the spending of the employees of the program and all other supported employees (such as subcontractors), as well as the employment generated by the spending from employees on various items such as restaurants, groceries, entertainment, etc.

It should be acknowledged, however, that there are other impacts that are indirectly associated with the EIP that are *not* counted in this Economic Impact Analysis. For instance, ongoing operational or recreational uses of public land and facilities that may be "facilitated" by the EIP but are not counted in the program's direct expenditures were not counted in this analysis. To illustrate this dynamic, consider the Round Hill Pines Resort Retrofit, which was an EIP project to construct certain stormwater and recreation infrastructure improvements at a public beach facility that had clear environmental benefits. The direct economic impact from construction of the EIP-funded improvements are therefore included in this study; however, the analysis does *not* count the ongoing economic activity that may have resulted from the improvements at Round Hill Pines Resort on a yearly basis.

Generally, unless directly funded by the EIP, tourism revenues, property values, and the ability for properties to be redeveloped, etc. are beyond the scope of this study and are not captured in this Economic Impact Analysis. A future update to this analysis could add these types of economic impacts to present a more complete and more comprehensive estimate of the economic value of the EIP.

Economic Impacts Defined

As noted above, economic impacts presented in this analysis utilize IMPLAN. IMPLAN results are generally expressed in terms of direct, indirect, and induced impacts, each of which are summarized below.

- **Direct Impacts** are the actual activities being analyzed in the study. In this case, the direct impacts refer to the EIP spending itself.

- **Indirect impacts** refer to effect of industries that are dependent on the direct spending industries for their input, also known as the supplier effect. To illustrate this effect, consider a stormwater basin construction project. The builder of the project must purchase a variety of goods and services, such as construction materials, equipment rentals, etc. These purchases represent "indirect" effects and are additive to the initial direct impacts.

- **Induced impacts** refer to the response of the economy to changes in household expenditures as a result of income generated by the direct and indirect effects. In other words, the induced impacts are those that are circulated through the economy as the result of the spending of employees within the direct and indirect sectors on items such as clothing, groceries, entertainment, etc. This spending is circulated through the local economy several times and make up the "multiplier effect" described above, which further support employment, wages, and output.

The Economic Impact Analysis presents results in terms of Jobs and Economic Output, which are defined below:

- **Economic Output.** The primary measure of economic activity used in this Economic Impact Analysis is economic output, which is presented in constant 2018 dollars. IMPLAN defines economic output as representing the value of industry production. In other words, economic output is the overall dollar value of the activity being studied.

- **Jobs.** For the purpose of this analysis, jobs are defined by IMPLAN as an Industry-specific mix of full-time, part-time, and seasonal employment (in other words, "total jobs"). Jobs are presented as an annual average that accounts for seasonality and follows the same definition used by the U.S. Bureaus of Labor Statistics and Economic Analysis.

Quantification of Direct Impacts

In this Economic Impact Analysis, the "direct impact" which is used to calculate indirect and induced impacts is the actual spending on the basin-wide EIP program. The EIP is a partnership of nearly 80 organizations working together to achieve the environmental goals of the Lake Tahoe region. Local, state, and federal government agencies, private entities, scientists, and the Washoe Tribe of Nevada and California have collaborated for more than 20 years to implement the EIP.

The EIP spending is derived from a variety of sources, including federal appropriations, state agency funds, local jurisdiction contributions, development impact fees, grants, private property owner investments, philanthropy and various other miscellaneous sources. These dollars are spent on an agreed upon program of work that improves regional environmental quality in the Tahoe Basin.

The major EIP Program Areas, along with the typical types of projects within each, are shown below.

EIP Programs	Types of Projects
Water Quality	• Stormwater Infrastructure • Operations and Maintenance • Retrofit of Highways and Roads
Watershed Restoration	• Wetland and Stream Restoration • Aquatic Invasive Species Removal • Wildlife Habitat Restoration • Land Acquisitions
Forest Health	• Forest Thinning to Reduce Hazardous Fuels • Native Vegetation Restoration and Protection
Transportation	• Building and Improving of Bike and Pedestrian Paths • Building and Enhancing Transit Networks • Operations and Maintenance
Sustainable Recreation	• Recreation Facility Improvements • Building and Improving Recreational Trails
Environmental Stewardship	• Public Education Events and Campaigns
Applied Science	• Scientific Research • EIP Program Monitoring

WBA Consulting has carefully analyzed the spending from the EIP throughout its life span from which to run the input/output model. TRPA hosts an online EIP Tracker that provides a detailed accounting of EIP program investments, which includes detailed attributes for each project such as location, funding source, status, and program category. WBA used the running total of EIP expenditures to date from the EIP Tracker which were used for the direct inputs in the economic impact model. This spending was adjusted to constant 2020 dollars using CPI. Spending data used in this analysis can be found at www.eip.laketahoeinfo.org.

Next, we organized the expenditure data into the program area categories. For projects that were entered to the TRPA EIP database in the early years of the program (between 1997 and 2009), the expenditures were not classified by TRPA in the same way that they were after 2009. To organize all data into uniform categories, WBA applied the percentage share of "unallocated" spending from 1997 to 2009 to each category on a proportionate basis using the total spending after 2009.

Spending by category is shown in **Table 2,** illustrating total spending as well as the average annual amounts from 1997 to 2019. **Figure A-1** in **Appendix A** displays the spending data by time period and shows how the spending from 1997 to 2009 was allocated to each category.

Table 2
Summary of Direct EIP Expenditures: 1997 - 2019 *

Category	Total Expenditures	Average Annual Expenditures
Water Quality	$1,459,549,935	$66,343,179
Watershed Restoration	$284,170,167	$12,916,826
Forest Health	$363,577,198	$16,526,236
Transportation	$657,920,574	$29,905,481
Sustainable Recreation	$301,231,620	$13,692,346
Environmental Stewardship	$21,378,064	$971,730
Applied Science	$89,779,144	$4,080,870
Total	**$3,177,606,702**	**$144,436,668**

Sources: TRPA and WBA

* Results are based on total nominal expenditures of approximately $2.5 billion, which equates to approximately $3.1 billion in 2020 dollars when adjusted for inflation.

Indirect and Induced Impacts

Using the EIP's expenditures to date as the basic "direct" impact in the input/output model, WBA utilized IMPLAN to calculate total economic impacts including indirect and induced impacts. The total expenditures for each EIP category was then matched to the most pertinent IMPLAN sector and the impacts are measured for each of the main counties for the Tahoe region, which include Placer, El Dorado, Douglas, Washoe, Nevada, Carson City, and Alpine counties. The results of these calculations are presented in **Table 3** (Output) and **Table 4** (Jobs).

As shown in Table 3, the $3.1 billion in direct spending from the EIP during its life span translates to a total $5.2 economic impact when including the indirect and induced effects. As shown in Table 4, the EIP has supported nearly 38,000 jobs during this period.

Table 3 Summary of Economic Output Generated by the EIP: 1997 - 2019 *				
Category	**Direct Impacts**	**Indirect Impacts**	**Induced Impacts**	**Total Impacts**
Economic Output				
Water Quality	$1,459,549,935	$364,398,389	$422,154,061	$2,246,102,385
Watershed Restoration	$284,170,167	$87,304,669	$171,512,358	$542,987,194
Forest Health	$363,577,198	$38,333,992	$210,998,163	$612,909,353
Transportation	$657,920,574	$164,259,674	$190,294,169	$1,012,474,417
Sustainable Recreation	$301,231,620	$101,988,740	$138,078,951	$541,299,311
Environmental Stewardship	$89,779,144	$29,619,970	$50,546,923	$169,946,037
Applied Science	$21,378,064	$9,426,323	$9,804,486	$40,608,873
Subtotal Economic Output	**$3,177,606,702**	**$795,331,757**	**$1,193,389,111**	**$5,166,327,570**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA				
* Results are based on total nominal expenditures of approximately $2.5 billion, which equates to approximately $3.1 billion in 2020 dollars when adjusted for inflation.				

Table 4 Summary of Jobs Generated by the EIP: 1997 - 2019				
Category	**Direct Impacts**	**Indirect Impacts**	**Induced Impacts**	**Total Impacts**
Jobs				
Water Quality	6,266	1,725	2,605	10,596
Watershed Restoration	2,800	465	1,059	4,324
Forest Health	8,812	188	1,303	10,303
Transportation	2,825	778	1,174	4,776
Sustainable Recreation	4,363	599	851	5,813
Environmental Stewardship	923	213	312	1,448
Applied Science	399	54	61	514
Subtotal Jobs	**26,388**	**4,022**	**7,365**	**37,774**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA				

Breakdown by Industry Sector

This section provides some additional detail regarding the impacts of the various categories of activities studied in this Economic Impact Analysis. In the future, TRPA or other parties may use the multiplier factors described below to assess the amount of economic activity that certain future expenditures, programs, or projects may provide to the Lake Tahoe Region. Of course, it should be noted that impacts can vary significantly depending upon the specific activities, attributes, and locations of each individual project. These factors provide a good "rule of thumb" that can be applied for future projects in the region.

Table 5 below summarizes the impacts of each program area analyzed. It shows the IMPLAN Sector used to arrive at results, and the amount of "leverage" that each category can achieve for every dollar invested.

Table 5
Summary of IMPLAN Sector and Multipliers by EIP Category

EIP Category	Corresponding IMPLAN Sector	IMPLAN Sector	Total Economic Output per $1.00 Invested	Total Jobs Per $1M Invested
Water Quality	Construction of New Highways and Streets	54	$1.54	7.3
Watershed Restoration	Construction of other new nonresidential structures	56	$1.91	15.2
Forest Health	Support Activities for Agriculture and Forestry	19	$1.69	28.3
Transportation	Construction of New Highways and Streets	54	$1.54	7.3
Sustainable Recreation	Other Amusement and Recreation Industries	504	$1.80	19.3
Environmental Stewardship	Other Educational Services	482	$1.90	24.0
Applied Science	Environmental and Other Technical Consulting	463	$1.89	16.1

Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA

Conclusion

Detailed backup tables which display all data and calculations used in this Economic Impact Analysis are presented in **Appendix A**. For any questions about this White Paper, please contact Jesse W. Walker at jesse@wbaplanning.com or (775) 580-7478.

Appendix A:

Technical Backup Tables

Table A-1
Summary of EIP Spending, 1997 - 2019 *

Program	Total Expenditures 1997 - 2019	% of Known Expenditures	Allocation of Unclassified Expenditures [2]	Total Expenditures
Water Quality	$517,978,923	45.9%	$941,571,012	$1,459,549,935
Watershed Restoration	$100,849,004	8.9%	$183,321,163	$284,170,167
Forest Health	$129,029,724	11.4%	$234,547,474	$363,577,198
Transportation	$233,489,093	20.7%	$424,431,481	$657,920,574
Sustainable Recreation	$106,903,934	9.5%	$194,327,686	$301,231,620
Environmental Stewardship	$7,586,850	0.7%	$13,791,214	$21,378,064
Applied Science	$31,861,674	2.8%	$57,917,470	$89,779,144
Subtotal	**$1,127,699,202**	**100.0%**	**$2,049,907,500**	**$3,177,606,702**
Unclassified Expenditures (1997-2009) [1]	**$2,049,907,500**			
Total Expenditures	**$3,177,606,702**			

Source: TRPA EIP Project Tracker

* Results are based on total nominal expenditures of approximately $2.5 billion, which equates to approximately $3.1 billion in 2020 dollars when adjusted for inflation.

[1] EIP expenditures from 1997 to 2009 were not tracked by program area category in same way that 2010 to 2019 expenditures were. The lump sum amount from this period is shown as an "unclassified" total and is inflated to 2020 dollars.
[2] WBA applied the proporationate share of spending by category from 2010 to 2019 to the "unclassified" amount.

Table A-2 Water Quality Sector 54 - Construction of New Highways and Streets IMPLAN Modeling Results		
Category	**Base Value**	**Annualized** 1997 - 2019
Economic Output		
Direct	$1,459,549,935	$66,343,179
Indirect	$364,398,389	$16,563,563
Induced	$422,154,061	$19,188,821
Total	**$2,246,102,385**	**$102,095,563**
"Value Added" [1]	**$786,552,450**	**$35,752,384**
"Leverage Per $1.00" of Direct Exp.	$1.54	$1.54
Employment		
Direct	6,266.0	284.8
Indirect	1,725.2	78.4
Induced	2,604.9	118.4
Total	**10,596.1**	**481.6**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA		

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-3 Watershed Restoration Sector 56 - Construction of Other New Non-Residential Structures IMPLAN Modeling Results		
Category	**Base Value**	**Annualized** 1997 - 2019
Economic Output		
Direct	$284,170,167	$12,916,826
Indirect	$87,304,669	$3,968,394
Induced	$171,512,358	$7,796,016
Total	**$542,987,194**	**$24,681,236**
"Value Added" [1]	**$258,817,027**	**$11,764,410**
"Leverage Per $1.00" of Direct Exp.	$1.91	$1.91
Employment		
Direct	2,800.2	127.3
Indirect	465.2	21.1
Induced	1,058.5	48.1
Total	**4,323.9**	**196.5**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA		

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-4
Forest Health
Sector 19 - Support Activities for Agriculture and Forestry
Initial IMPLAN Modeling Results

Category	Base Value	Annualized 1997 - 2019
Economic Output		
Direct	$363,577,198	$16,526,236
Indirect	$38,333,992	$1,742,454
Induced	$210,998,163	$9,590,826
Total	**$612,909,353**	**$27,859,516**
"Value Added" [1]	**$249,332,155**	**$11,333,280**
"Leverage Per $1.00" of Direct Exp.	$1.69	$1.69
Employment		
Direct	8,811.9	400.5
Indirect	188.1	8.6
Induced	1,303.1	59.2
Total	**10,303.1**	**468.3**

Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-5 Transportation Sector 54 - Construction of New Highways and Streets Initial IMPLAN Modeling Results		
Category	**Base Value**	**Annualized** 1997 - 2019
Economic Output		
Direct	$657,920,574	$29,905,481
Indirect	$164,259,674	$7,466,349
Induced	$190,294,169	$8,649,735
Total	**$1,012,474,417**	**$46,021,564**
"Value Added" [1]	**$354,553,843**	**$16,116,084**
"Leverage Per $1.00" of Direct Exp.	$1.54	$1.54
Employment		
Direct	2,824.5	128.4
Indirect	777.7	35.3
Induced	1,174.2	53.4
Total	**4,776.4**	**217.1**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA		

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-6 Sustainable Recration Sector 504 - Other Amusement and Recreation Industries Initial IMPLAN Modeling Results		
Category	**Base Value**	**Annualized** 1997 - 2019
Economic Output		
Direct	$301,231,620	$13,692,346
Indirect	$101,988,740	$4,635,852
Induced	$138,078,951	$6,276,316
Total	**$541,299,311**	**$24,604,514**
"Value Added" [1]	**$240,067,691**	**$10,912,168**
"Leverage Per $1.00" of Direct Exp.	$1.80	$1.80
Employment		
Direct	4,362.6	198.3
Indirect	598.9	27.2
Induced	851.3	38.7
Total	**5,812.8**	**264.2**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA		

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-7 Environmental Stewardship Sector 482 - Other Educational Services Initial IMPLAN Modeling Results		
Category	**Base Value**	**Annualized** 1997 - 2019
Economic Output		
Direct	$21,378,064	$971,730
Indirect	$9,426,323	$428,469
Induced	$9,804,486	$445,658
Total	**$40,608,873**	**$1,845,858**
"Value Added" [1]	**$19,230,809**	**$874,128**
"Leverage Per $1.00" of Direct Exp.	$1.90	$1.90
Employment		
Direct	399.3	18.2
Indirect	54.3	2.5
Induced	60.5	2.8
Total	**514.1**	**23.4**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA		

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-8 Applied Science Sector 463 - Environmental and Other Technical Consulting Initial IMPLAN Modeling Results		
Category	**Base Value**	**Annualized** 1997 - 2019
Economic Output		
Direct	$89,779,144	$4,080,870
Indirect	$29,619,970	$1,346,362
Induced	$50,546,923	$2,297,587
Total	**$169,946,037**	**$7,724,820**
"Value Added" [1]	**$80,166,893**	**$3,643,950**
"Leverage Per $1.00" of Direct Exp.	$1.89	$1.89
Employment		
Direct	923.1	42.0
Indirect	212.5	9.7
Induced	312.1	14.2
Total	**1,447.7**	**65.8**
Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA		

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.

Table A-9
Total All Program Categories

Initial IMPLAN Modeling Results

Category	Base Value	Annualized 1997 - 2019
Economic Output		
Direct	$3,177,606,702	$144,436,668
Indirect	$795,331,757	$36,151,444
Induced	$1,193,389,111	$54,244,960
Total	**$5,166,327,570**	**$234,833,071**
"Value Added" [1]	**$1,988,720,868**	**$90,396,403**
"Leverage Per $1.00" of Direct Exp.	$1.63	$1.63
Employment		
Direct	26,387.6	1,199.4
Indirect	4,021.9	182.8
Induced	7,364.6	334.8
Total	**37,774.1**	**1,717.0**

Sources: TRPA, IMPLAN 2018 Economic Impact Model, and WBA

Note: includes impacts to Placer, El Dorado, Alpine, Nevada, Douglas, Carson City, and Washoe Counties.

[1] Includes direct and indirect output.