

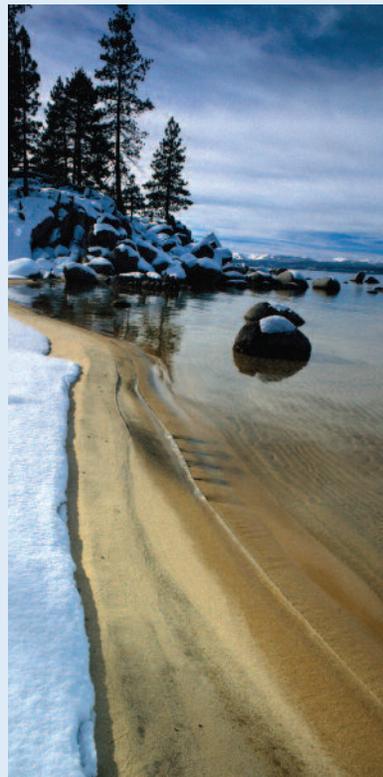


*continuing the commitment*

# RESTORATION IN PROGRESS

ENVIRONMENTAL IMPROVEMENT PROGRAM UPDATE ||  
PLANNING HORIZON THROUGH 2018

*lake tahoe*



# Lake Tahoe

## RESTORATION IN PROGRESS

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ENVIRONMENTAL IMPROVEMENT PROGRAM

“It’s our moral obligation to be faithful stewards of our heritage and protect this area for future generations. So that’s why we’re here today.”

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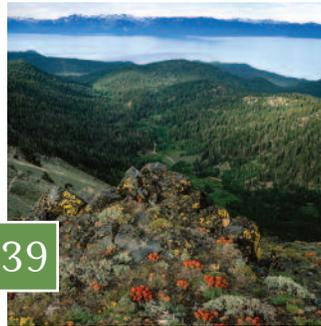
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# Program Overview



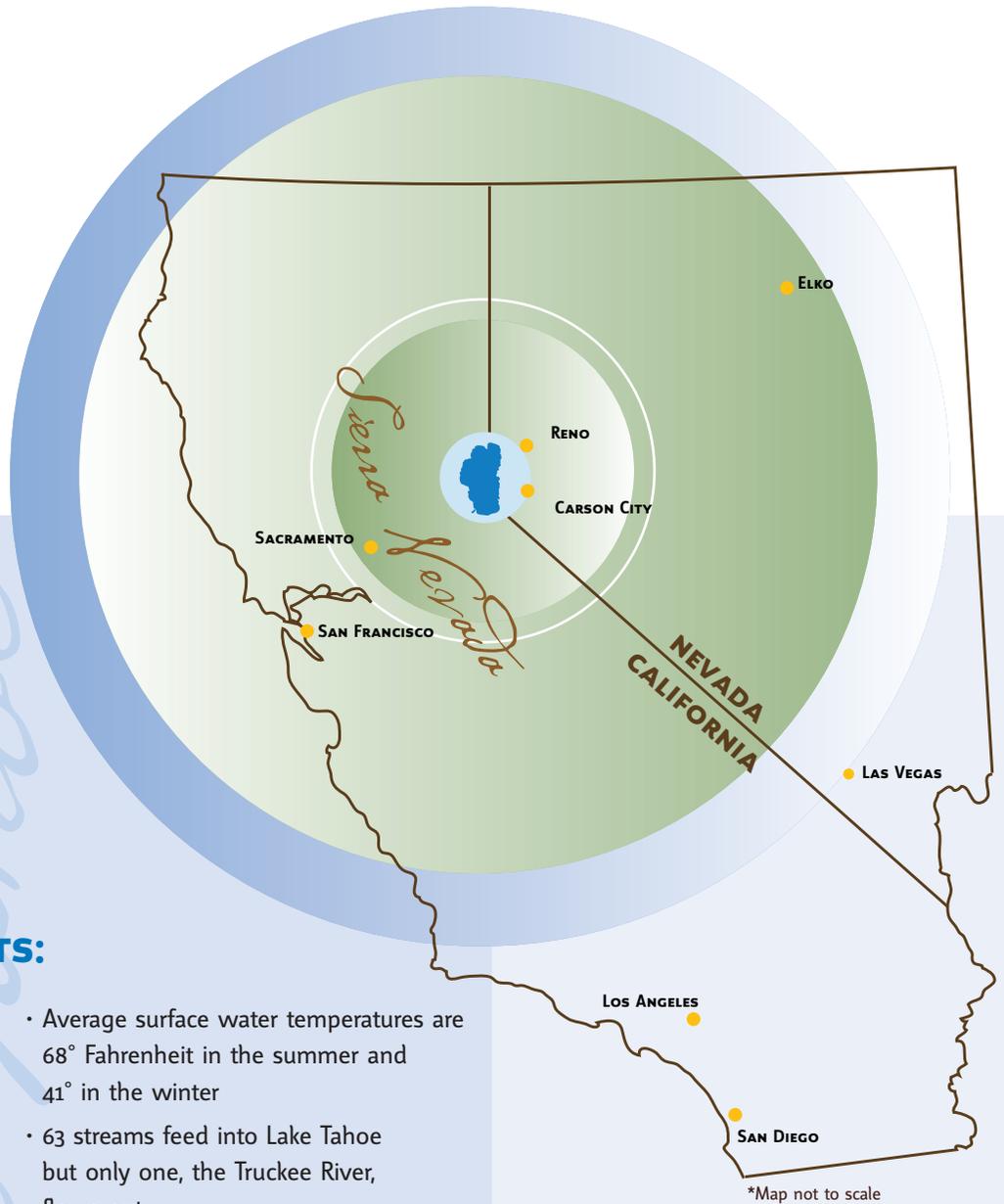
## LAKE TAHOE: A NATIONAL TREASURE

LAKE TAHOE IS ONE OF THE LARGEST, DEEPEST, AND CLEAREST LAKES in the world. Its cobalt blue appearance, spectacular alpine setting, and remarkable water clarity is recognized worldwide. The Lake's earliest inhabitants, the Washoe Tribe, demonstrated a deep respect for the fragile environment that was their home and still revere this magnificent place. Recreational opportunities and scenic vistas have made Lake Tahoe a top national and international tourist destination.



Like many national treasures, the Lake Tahoe Basin is threatened by the impacts of the land use and transportation patterns developed in the last generation. The Lake's water clarity declined by nearly a foot every year from the late 1960s to the end of the century, and has only recently begun to stabilize. Fine sediment particles and algae-nourishing phosphorus and nitrogen continue to flow into the Lake from urban and highway runoff, air pollution, and other sources. The Basin's current transportation infrastructure inadequately accommodates traffic in peak travel seasons, bike and pedestrian users, and public access to the Lake.

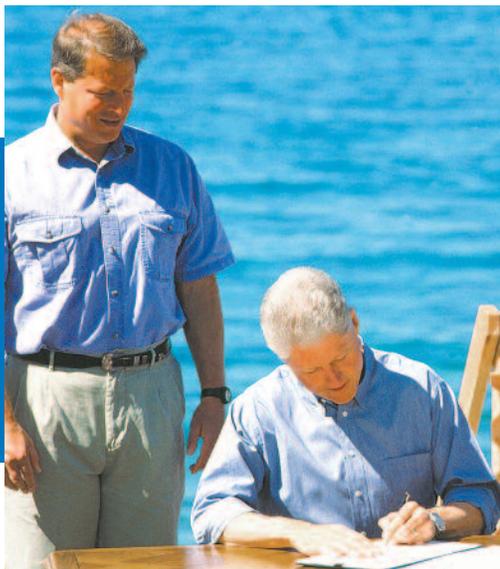
Lake Tahoe is situated within the Sierra Nevada Mountain Range straddling the California-Nevada border. The main crest of the Sierra Nevada Range is found to the west and the Carson Range to the east. Two thirds of Lake Tahoe is in California and the remainder is in Nevada.



## LAKE TAHOE FAST FACTS:

- Lake Tahoe is 2 million years old
- Holds 39 trillion gallons of water
- Size of watershed: 501 sq. miles
- Lake surface area: 192 sq. miles
- 12 miles wide
- 22 miles long
- 72 miles of shoreline
- 1,645 ft. deep
- 6,223 ft. elevation (natural rim)
- 2 states: CA, NV
- 5 counties, 1 city
- 66,000 Tahoe Basin year-round residents
- Majority of private property owners are part-time residents
- US Forest Service and state agencies manage almost 85% of land area
- Average surface water temperatures are 68° Fahrenheit in the summer and 41° in the winter
- 63 streams feed into Lake Tahoe but only one, the Truckee River, flows out
- Approximately 3 million people visit Lake Tahoe every year
- The Lake is designated as an Outstanding National Resource Water under the Federal Clean Water Act
- Lake Tahoe is the second deepest lake in the United States
- Lake Tahoe is so deep that a single drop of water entering the Lake today will take about 650 years to find its way out

\*Map not to scale



We have a shared responsibility to build on our commitment at all levels to be sure the Lake and its environs are protected.

President Bill Clinton, Lake Tahoe Presidential Forum, July 26, 1997

President Bill Clinton and Vice President Al Gore at the 1997 Lake Tahoe Presidential Forum.

The Tahoe Basin is facing several new and emerging challenges. The Angora Wildfire of 2007 raised awareness that the Basin's overstocked forests have dramatically increased the risk of catastrophic wildfire. The recent appearance of several aquatic invasive species also threatens the ecological health of the Lake, the quality of its beaches, and the drinking water supplies of many local communities.

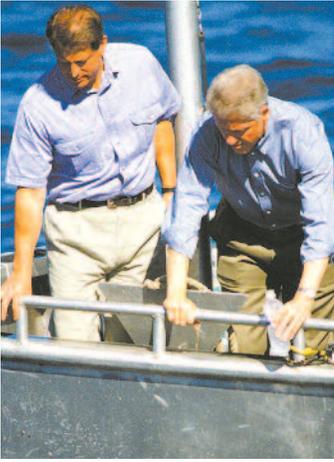
Looking to the future, the impacts of climate change pose a major threat to both the environment and economy of the Tahoe Basin. The average surface temperature of Lake Tahoe in July has risen by more than 3 degrees Fahrenheit since 1999, and more precipitation is falling as rain rather than snow. If these trends continue, sediment-laden runoff may increase, and the Lake may no longer mix enough to retain its clarity. These changes could also devastate the tourist-dependent economy.

Significant continued investments will be needed from federal, state, local, and private sources to effectively address these challenges, and to maintain a collaborative effort in protecting the environment and the economy of the Lake Tahoe Basin.

## A SHARED RESPONSIBILITY

Restoring and protecting Lake Tahoe has been a shared responsibility since 1969 when the states of California and Nevada established the Tahoe Regional Planning Agency (TRPA), the nation's first bi-state environmental planning and regulatory agency. The United States Congress ratified the Bi-State Compact which created TRPA and the federal government is a key partner in this shared responsibility. TRPA has a unique role in working cooperatively with its federal, state, local, and private partners to protect the ecological health of the Basin while providing for orderly growth and development consistent with environmental standards. The Agency's 15-member board includes members from the two states, locally elected officials, and a non-voting Presidential appointee.

The Compact, as revised in 1980, gave TRPA authority to adopt environmental quality standards, called thresholds, and to define the capacity of the Region to accommodate additional development. The TRPA Governing Board adopted the threshold standards in 1982, and in 1987 they enacted a Regional Plan setting forth strategies to achieve the



At left: President Bill Clinton and Vice President Al Gore aboard a research vessel on Lake Tahoe.

thresholds. The Compact also requires the Regional Plan to contain provisions to help reduce dependency on the private automobile in order to better protect air and water quality.

## HISTORY OF THE ENVIRONMENTAL IMPROVEMENT PROGRAM

TRPA launched the Environmental Improvement Program (EIP) in an effort to better implement the Regional Plan and highlighted it at the Presidential Forum at Lake Tahoe in 1997. Recognizing that capital investments, research, and monitoring were essential components of the Regional Plan, the EIP called for an investment of \$908 million in capital projects and \$58 million in research and monitoring. The EIP also identified hundreds of specific projects and programs to be undertaken by more than 50 funding partners, including federal, state, and local agencies and the private sector. The projects were focused on improving air, water, and scenic quality, forest health, fish and wildlife, and public access to the Lake and other recreation areas. The prime directive of the EIP was to move the Tahoe Basin closer to environmental threshold attainment.

## THE FEDERAL PARTNERSHIP

The federal government has a long history of conservation in the Lake Tahoe Basin. Preservation efforts include congressional approval of the Compact, the consolidation of three national forests into the Lake Tahoe Basin Management Unit (LTBMU) of the US Forest Service to protect the watershed, and the passage of numerous funding bills.

At the 1997 Lake Tahoe Forum, President Clinton and Vice President Gore renewed the federal commitment to Lake Tahoe by issuing an Executive Order creating the Lake Tahoe Federal Interagency Partnership. Through this collaborative effort, the federal agencies agreed to increase federal funding to strive toward attainment of environmental thresholds, and to coordinate all federal activities in the Basin. Oversight of the partnership is provided by the Tahoe Regional Executives, which consists of the regional administrators of partner agencies. Day-to-day coordination and program-level implementation rests with the Lake Tahoe Basin Executive Committee (LTBEC), which consists of the local federal officials in the Tahoe Basin.

The Lake Tahoe Restoration Act (LTRA) of 2000 authorized the federal share of the EIP funding, which allowed the Forest Service to invest \$300 million in EIP projects and programs. In 2003, Congress amended the Southern Nevada Public Land Management Act (SNPLMA) to allow the proceeds from sales of surplus federal lands in southern Nevada to fund the federal share of the EIP. Through the LTRA, SNPLMA, and other sources, the federal agencies invested more than \$293 million in the EIP from 1997 to 2006.

The Lake Tahoe Basin Management Unit of the Forest Service administers 75 percent of the land in the Lake Tahoe Basin, and is responsible for a broad range of EIP projects and programs. Other federal agencies providing significant contributions include the Army Corps of Engineers, the Bureau of Reclamation, the Fish and Wildlife Service, the Natural Resources Conservation Service, the Federal

Highway Administration, United States Geological Survey, and the Environmental Protection Agency.

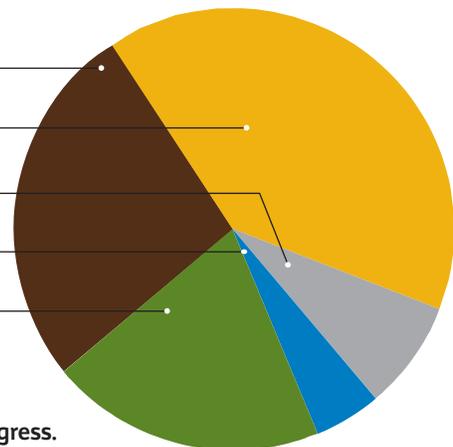
## STATE COMMITMENTS

The states of California and Nevada have also played a key role in developing and implementing the EIP. In 1997, Governor Wilson of California and Governor Miller of Nevada convened a gubernatorial summit in anticipation of the Presidential Forum, and signed a Memorandum of Agreement pledging their support for the EIP.

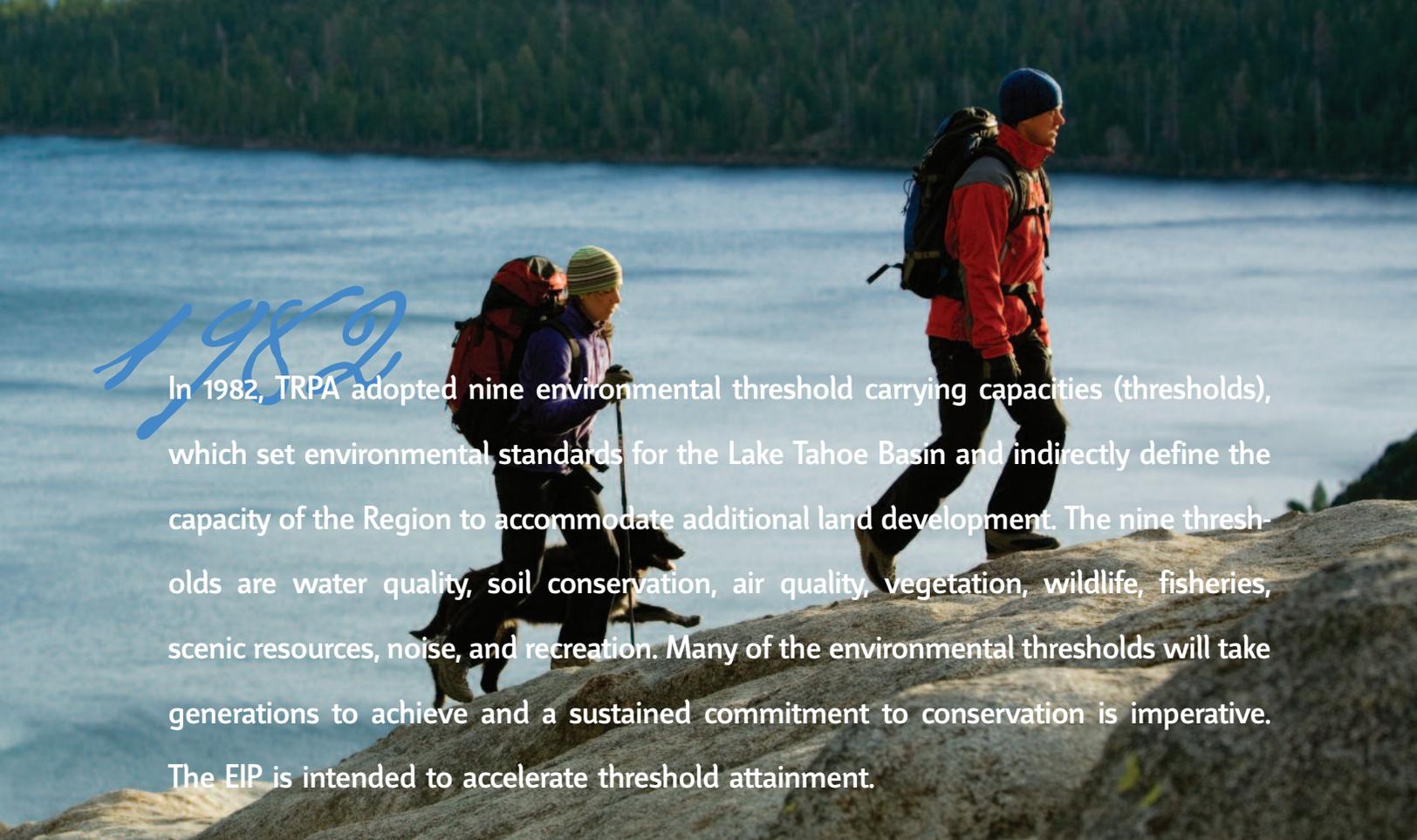
Voters in Nevada then approved a bond measure to provide \$82 million, Nevada's share of EIP funding for the first decade. The Divisions of State Lands, Environmental Protection, and Transportation are largely responsible for oversight and funding of EIP projects in Nevada.

### LOOKING BACK: EIP CAPITAL INVESTMENT IN PROJECTS BY FUNDING SECTOR: 1997-2006

● <b>Federal:</b>	\$293 million (27%)
● <b>State of CA:</b>	\$446 million (40%)
● <b>State of NV:</b>	\$82 million (8%)
● <b>Local:</b>	\$53.4 million (5%)
● <b>Private:</b>	\$216 million (20%)
<b>TOTAL:</b>	<b>\$1.1 billion</b>



Funds reflected in this graph represent projects completed or in progress.



In 1982, TRPA adopted nine environmental threshold carrying capacities (thresholds), which set environmental standards for the Lake Tahoe Basin and indirectly define the capacity of the Region to accommodate additional land development. The nine thresholds are water quality, soil conservation, air quality, vegetation, wildlife, fisheries, scenic resources, noise, and recreation. Many of the environmental thresholds will take generations to achieve and a sustained commitment to conservation is imperative. The EIP is intended to accelerate threshold attainment.

## ENVIRONMENTAL THRESHOLD GOALS FOR THE LAKE TAHOE BASIN

**Water Quality:** Return the Lake to 1960s water clarity and algal levels by reducing nutrient and sediment in surface runoff and groundwater.

**Soil Conservation:** Preserve natural stream environment zones (SEZ), restore 25% of disturbed urban SEZ areas (1,100 acres), and reduce total land coverage.

**Air Quality:** Achieve strictest of federal, state, or regional standards for carbon monoxide, ozone, and particulates; increase visibility; reduce U.S. 50 traffic; and reduce vehicle miles of travel.

**Vegetation:** Increase plant diversity in forests, preserve uncommon plant communities including deepwater plants, enhance late seral forests and reduce forest fuels, and maintain minimum sustainable populations of sensitive plants including Tahoe Yellow Cress.

**Wildlife:** Provide habitat for special interest species, prevent degradation of habitats of special significance.

**Fisheries:** Maintain 180 miles of good to excellent stream habitat, achieve nearly 6,000 acres of excellent lake habitat, and attempt to reintroduce Lahontan Cutthroat Trout.

**Scenic Resources:** Maintain or improve 1982 roadway and shoreline scenic travel route ratings, maintain or improve views of individual scenic resources, and maintain or improve quality of views from public outdoor recreation areas.

**Noise:** Minimize noise disturbance from single events, and minimize background noise disturbance in accordance with land use patterns.

**Recreation:** Preserve and enhance a high quality recreational experience. Preserve undeveloped shorezone and other natural areas, and maintain a fair share of recreational capacity for the general public.

The state of California also fulfilled its funding commitment in the first decade of the EIP. Through projects funded primarily by the California Tahoe Conservancy, State Parks, and Caltrans, the state of California committed more than \$446 million to EIP projects from funds made available from Propositions 204, 12, 40, 50, 84, and other sources.

## LOCAL AND PRIVATE CONTRIBUTIONS

Local and private contributions have been one of the hallmarks of the EIP. Because stormwater runoff from local roads and private residential and commercial development conveys sediment and other pollutants that degrade Lake clarity, erosion control measures known as best management practices (BMPs) are an important component of the Regional Plan and the EIP. Through investments in BMPs and other projects, local and private sources have contributed nearly \$270 million in the first decade of the EIP.

The major EIP partners in local government include the counties of Washoe, Douglas, El Dorado, and Placer, the city of South Lake Tahoe, and local utility and fire protection districts. Private partners include a broad spectrum of interests, including the Heavenly Mountain Resort and Homewood ski area, the Chambers of Commerce on the north and south shores, the North Lake Tahoe Resort Association, the League to Save Lake Tahoe, and the Lake Tahoe Transportation and Water Quality Coalition.

## LOOKING BACK – A DECADE OF ACCOMPLISHMENTS

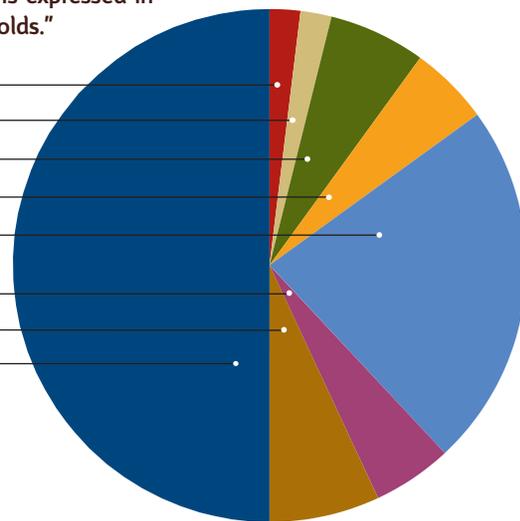
In total, all partners contributed more than \$1.1 billion for EIP projects and programs in the first phase. Approximately 270 EIP capital projects are on the ground, and hundreds more are in the planning and implementation stages. These projects have improved the health of

### EIP INVESTMENT BY ENVIRONMENTAL THRESHOLD: 1997-2006

#### Categories of Investment

The environmental and ecological value of the Basin is expressed in terms of categories called the "Environmental Thresholds."

● Wildlife	2%	_____
● Fisheries	2%	_____
● Vegetation	6%	_____
● Recreation	5%	_____
● Air Quality/Transportation	23%	_____
● Scenic Resources	5%	_____
● Soil Conservation	7%	_____
● Water Quality	50%	_____



In recent years, funding for forest health and vegetation projects has increased dramatically and will continue to help reduce the threat of catastrophic wildfire.



**Left: US Senator Dianne Feinstein of California addresses the public at the 12th Annual Lake Tahoe Summit. Seated at right include Governor Jim Gibbons of NV, Undersecretary of Agriculture Mark E. Rey, and Secretary of Interior Dirk Kempthorne. Right: Sunset at Lake Tahoe.**

Tahoe forests and watersheds, reduced traffic congestion and air pollution on the Basin’s roadways, and increased public access to the Lake and other recreation areas.

The latest water quality data suggest that these investments are also making a difference in reversing the downward slide in Lake Tahoe’s fabled water clarity. After decades of steady decline, the Lake’s clarity has stabilized in recent years, and new modeling results predict that the Basin’s clarity goals can be achieved with sustained funding and project implementation from the EIP partners.

## **LOOKING AHEAD – A RENEWED COMMITMENT**

The next 10-year phase of the EIP will build upon our accomplishments to date, with an increased emphasis on monitoring and focused research, adaptive management, and performance benchmarks. These new areas of emphasis are essential to ensure that the most cost-effective projects are implemented, and to better document and evaluate progress toward meeting the environmental thresholds.

Another priority will be to launch a new strategy to advance Lake Tahoe’s clarity goals.

In 2002, the states of California and Nevada cooperatively began to develop a water quality restoration plan for Lake Tahoe, known as the Total Maximum Daily Load, or TMDL, as required by the Clear Water Act. As part of those efforts, the states have issued a “Clarity Challenge” which calls for an improvement in clarity from 70 feet to 80 feet in 15 to 20 years. The agencies are now in an extensive collaborative process to complete the TMDL, and TRPA will be incorporating the TMDL findings and strategies into the update of the Regional Plan.

Addressing the potential impacts of climate change will also be a new element of the EIP. The EIP partner agencies are launching a comprehensive climate change strategy to reduce the Basin’s carbon footprint, to adapt to already well-documented changes in local forests and watersheds, and to help redevelop the Basin’s dated urban areas into vibrant, sustainable communities.

Other EIP priorities include:

- Achieving the fuels reduction targets in the 10-year Multi-Jurisdictional Fuels Reduction and Wildfire Prevention Strategy;
- Restoring and protecting the Basin’s watersheds and stream environment zones;

- Adopting and implementing a comprehensive aquatic invasive species management plan;
- Expanding the Basin’s transit facilities and bike and pedestrian trail network;
- Achieving the milestones in the Lahontan Cutthroat Trout and Tahoe Yellow Cress Recovery Plans; and
- Improving Lake access and recreational facilities.

An additional \$2.45 billion in public and private investments will be needed over the next decade to effectively implement these and other EIP programs and to maintain progress toward meeting the Basin’s environmental threshold standards. While approximately \$700 million has already been committed to this phase by the EIP partners, an additional \$1.8 billion remains to be secured. TRPA and its federal, state, local, and private partners will be working together to raise these funds, to establish priority projects,

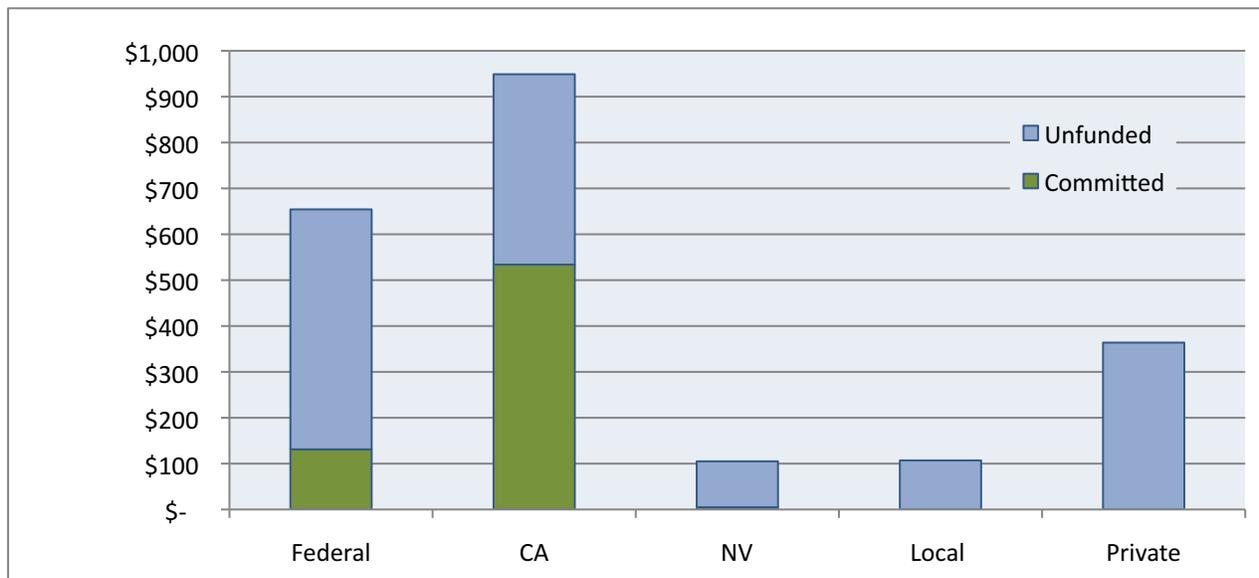
and to document our efforts in annual progress reports over the next decade of EIP implementation.

The next phase of the EIP will focus on six areas:

- Watersheds, Habitat, & Water Quality
- Forest Management
- Air Quality & Transportation
- Recreation & Scenic Resources
- Applied Science
- Program Support

EIP partners developed these six areas of emphasis through a collaborative process and to contribute to threshold attainment and maintenance. These six areas reflect a programmatic approach for grouping initiatives under the EIP by connecting projects directly to the threshold benefits they produce. Each of the six areas of emphasis include specific goals, actions, funding needs, measures of progress, project development guidance, and monitoring needs.

### Committed and Unfunded Capital Costs 2008-2018 (in millions) as of December 2008



Unfunded	\$523	\$415	\$100	\$107	\$364
Committed	\$131	\$534	\$5	\$0	\$0
<b>Total Shares</b>	<b>\$654</b>	<b>\$949</b>	<b>\$105</b>	<b>\$107</b>	<b>\$364</b>



Bob Richards takes a water clarity measurement.

“Since 2001, we have had seven years in which Lake clarity has consistently been better than the long-term trend would have predicted. This is unprecedented.”

– Geoffrey Schladow,  
Director of the  
Tahoe Environmental  
Research Center,  
UC Davis.

### A Conservation Plan for Lake Tahoe: The Environmental Improvement Program

- The EIP is a public-private partnership that rivals some of the largest collaborative restoration initiatives in the United States in its scope
- Approximately 300 EIP capital projects have been completed and hundreds more are in the planning and implementation stages
- The next phase of the EIP spans 10 years.

### EIP Research/Monitoring and Technical Assistance

- Funded \$48 million in research/monitoring
- Established the Tahoe Science Consortium to better inform agency decision making
- Federal agencies have provided nearly \$15.5 million in technical assistance to EIP partners.

### Watersheds, Habitat, and Water Quality

- Acquired 3,092 acres of sensitive land
- Improved over 13,927 acres for wildlife habitat
- Restored 739 acres of wetlands including 108 acres within the urban boundary
- Treated stormwater runoff from 26 miles of state highways, 323 miles of city/county roads, and 80 miles of US Forest Service lands
- Revegetated or removed 55 miles of dirt road in forests
- Completed and planned 25 projects to help restore the Upper Truckee River watershed which delivers more sediment into Lake Tahoe than any other tributary.

### Forest Management

- Treated 33,549 acres to achieve ecosystem restoration and/or forest fuel reduction goals
- Revegetated 374 acres
- Completed the Lake Tahoe Basin 10-Year Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy which qualifies Lake Tahoe to receive federal funding.

### Air Quality and Transportation

- Achieved a 20% reduction in vehicle traffic near Stateline, Nevada since 2001 because of transit-oriented redevelopment
- Constructed or rehabilitated 20 transit facilities and increased transit ridership to 1.5 million passengers annually
- Replaced 18 vehicles in the public transit fleet with clean-burning vehicles
- Constructed or planned 127 miles of new multi-purpose trails.

### Recreation and Scenic Resources

- Constructed or rehabilitated 82 public facilities to increase accessibility and the quality of the recreational experience
- Relocated more than 7 miles of overhead utility lines underground along highway corridors
- Acquired 2,388 linear ft. of Lake shoreline for public access.

\* Accomplishments reported through 2009.

# ENVIRONMENTAL IMPROVEMENT PROGRAM UPDATE AT-A-GLANCE



## WATERSHEDS, HABITAT, AND WATER QUALITY

### Stormwater Management Program

- Reducing Stormwater Pollution from City and County Roads
- Reducing Stormwater Pollution from State Highways
- Reducing Stormwater Pollution from Forest Roads
- Retrofitting Public and Private Facilities

### Watershed Management Program

- Restoring the Upper Truckee Watershed
- Restoring California Priority Watersheds

- Restoring Nevada Priority Watersheds
- Acquiring Environmentally Sensitive Lands
- Enhancing Fish and Wildlife Habitat

### Threatened, Endangered, and Sensitive Species Program

- Implementing Tahoe Yellow Cress Conservation Strategy
- Restoring and Recovering Lahonton Cutthroat Trout
- Protecting Other Sensitive Species

### Invasive Species Program

- Controlling Invasive Terrestrial Species
- Managing Aquatic Invasive Species

## FOREST MANAGEMENT

### Forest Ecosystem Health and Hazardous Fuels Reduction Program

- Advancing Forest Ecosystem Health and Reducing Hazardous Fuels
- Utilizing Biomass from Forest Fuels Reduction

## AIR QUALITY AND TRANSPORTATION

### Air Quality and Transportation Program

- Improving Air Quality
- Improving Transit and Trails Connections

## RECREATION AND SCENIC RESOURCES

### Recreation Program

- Improving Lake Access
- Developing a Comprehensive Trail System
- Improving Recreation Facilities
- Improving Educational and Interpretive Programs and Facilities

### Scenic Program

- Improving the Scenic Quality of Roadway Units
- Improving the Scenic Quality of Shorezone Units

## APPLIED SCIENCE PROGRAM

- Monitoring Program
- Applied Research Program
- Data and Information Management and Reporting

## PROGRAM SUPPORT

### Program Support, Reporting, and Technical Assistance Program

- Technical Assistance and Public Education
- Annual Coordination and Reporting
- Operations and Maintenance of Capital Projects



**LAKE TAHOE EIP**  
CONSERVATION. CLEARLY.

# LOOKING FORWARD: KEY EIP GOALS 2008-2018



## WATERSHEDS, HABITAT, AND WATER QUALITY

- Enhance or restore stream environment zones (wetlands) in priority watersheds
- Treat 400 terrestrial and aquatic invasive species sites annually
- Retrofit 300 miles of roadways with water quality improvements to reduce fine sediment loading
- Improve and protect 346 acres of wildlife habitat
- Cut fine sediment and nutrient loading as part of the "Clarity Challenge" target of 78 feet of clarity by 2028
- Continue to acquire and restore priority environmentally sensitive lands to protect and conserve the natural environment
- Restore and recover a self-sustaining lake form of Lahontan Cutthroat Trout in Lake Tahoe and Fallen Leaf Lake.

## FOREST MANAGEMENT

- Treat 68,000 acres for forest fuel reduction and ecosystem restoration, as identified in the 10-Year Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy
- Reduce open pile burning and encourage utilization of 125,000 tons of biomass
- Improve 1,500 acres of SEZ aspen communities.

## AIR QUALITY AND TRANSPORTATION

- Construct 43 miles of bike and pedestrian trails to help reduce dependency on the private automobile as directed by the Bi-State Compact
- Increase transit ridership from 1.5 million passengers per year to more than 3 million
- Reduce road sanding
- Replace 10 street sweepers with innovative machines to reduce fine sediment loading from roadways into Lake Tahoe
- Initiate waterborne transit system.

## RECREATION AND SCENIC RESOURCES

- Complete 40 recreation rehabilitation or construction projects
- Under-ground 6 miles of overhead utilities
- Implement 500 projects to meet scenic quality standards along shoreline and scenic highways.

## APPLIED SCIENCE

- Refine and implement monitoring and evaluation programs to assess the status of environmental conditions and determine the effectiveness of EIP restoration projects
- Support applied research to understand causal relationships and quantitatively describe underlying ecosystem processes
- Improve data and information management to utilize web-based systems; develop and adopt standard operating procedures for seamless data analysis and public reporting.

## OTHER PROGRAM ELEMENTS

- Provide education and technical assistance to the public to advance the EIP and overall environmental stewardship
- Operate and maintain EIP projects to ensure performance of capital investments
- Provide program administration and tracking.



Left: US Senator John Ensign of NV at the annual Lake Tahoe Forum in 2009. Right: From left, US Senator Harry Reid of NV, US Senator Dianne Feinstein of CA, CA Secretary of Resources Mike Chrisman, Governor Jim Gibbons of NV and seated is US Secretary of Interior Dirk Kempthorne at the 12th annual Lake Tahoe August event held at the Valhalla Historic Site in 2008.

## CLIMATE CHANGE, SUSTAINABLE PLANNING, & THE EIP

Global climate change is projected to have unprecedented impacts on the health of the environment and economy in the Lake Tahoe Basin. As temperatures rise and more precipitation falls as rain rather than snow, management efforts to protect the Basin's forests, fish and wildlife, and fabled water clarity will face unique challenges.

These changes are already well documented:

- Evening ambient low temperatures in the Basin have risen more than 4 degrees Fahrenheit since 1911, while the number of days with average air temperatures below freezing has dropped from 79 days to 52 days since that time.
- In the last 10 years, the average surface water temperature of Lake Tahoe in July has increased by approximately 3 degrees Fahrenheit.
- Increased runoff, combined with warmer Lake temperatures, has fueled the growth of algae, which absorbs light and further reduces water clarity.
- The Lake is becoming more hospitable to invasive plants and fish, with warm-water species like bass and carp increasingly common.
- Across the Sierra Nevada, fires are starting earlier, burning longer and over larger areas, which threatens water quality, wildlife habitat, and rural and resort communities.

To address these impacts, the EIP partner agencies are formulating a Basin-wide strategy to address climate change. The strategy is intended to ensure that all major planning and regulatory programs at Lake Tahoe are designed to take into account the projected impacts of climate change. For example, future EIP water quality and erosion control projects may need to be designed for larger peak flows in the winter, and habitat improvement projects may need to take into account potential changes in the type, location, and distribution of vegetation communities.



Reducing greenhouse gas emissions benefits air and water quality as well as human health. At right: Tahoe Keys.



**Making Lake Tahoe more walkable and bicycle-friendly are important EIP goals.**

The climate change strategy will provide a starting point for sustainable decision making in the Tahoe Basin. These actions will be addressed in a combination of plans and programs, including the EIP, the Lake Tahoe Regional Plan Update, the Regional Transportation Plan, Community Plans, and local actions.

As part of this comprehensive strategy, the EIP will be broadly focused on maintaining healthy forest ecosystems and watersheds and on improving mobility and access with environmentally-friendly transit. Mandates and incentives to develop sustainably-designed communities, projects, and green infrastructure will be developed as part of the update of the TRPA Regional Plan.

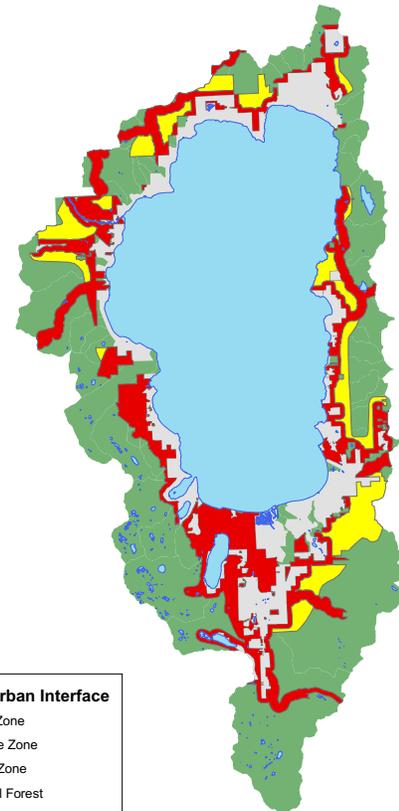
## FOREST MANAGEMENT AND WATERSHEDS

Forests will continue to be managed for ecosystem health and public safety purposes to reduce the threat of wildfire; this may in turn prevent the release of greenhouse gas (GHG) emissions during wildfires. Public land managers would use a science-based approach for restoration and management of the existing forests to minimize wildfires. Forest management will also consider what to do with forest fuels in a manner consistent with reducing GHG emissions.

Areas of significant disturbance would be improved through revegetation, restoration, and use of best management practices (BMPs). Forest fuel treatments within the wildland-urban interface (WUI) and communities will help reduce wildfire risk while considering scenic quality, proper soil and watershed function, water quality, and wildlife habitat. EIP programs will set out to make the Tahoe Basin a model of forest management for climate change mitigation and adaptation.

### Actions

- Reduce risk and severity of fires and catastrophic events
- Create forests that are resilient to rising temperatures, wildfire, changing hydrology, and insect outbreaks
- Revegetate disturbed areas and manage vegetation for adaptation to climate change
- Restore and improve habitats for fish and wildlife
- Control and reduce the spread of terrestrial and aquatic invasive species and infestations as the climate changes
- Restore watersheds for hydrologic function.





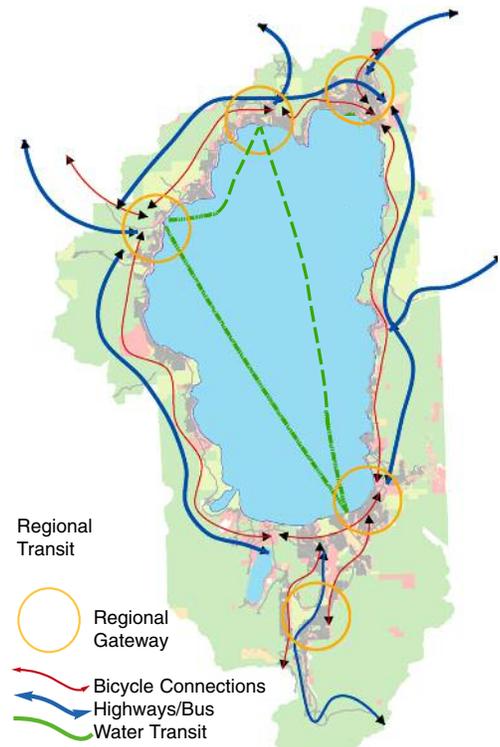
Transportation enhancements benefit multiple environmental thresholds.

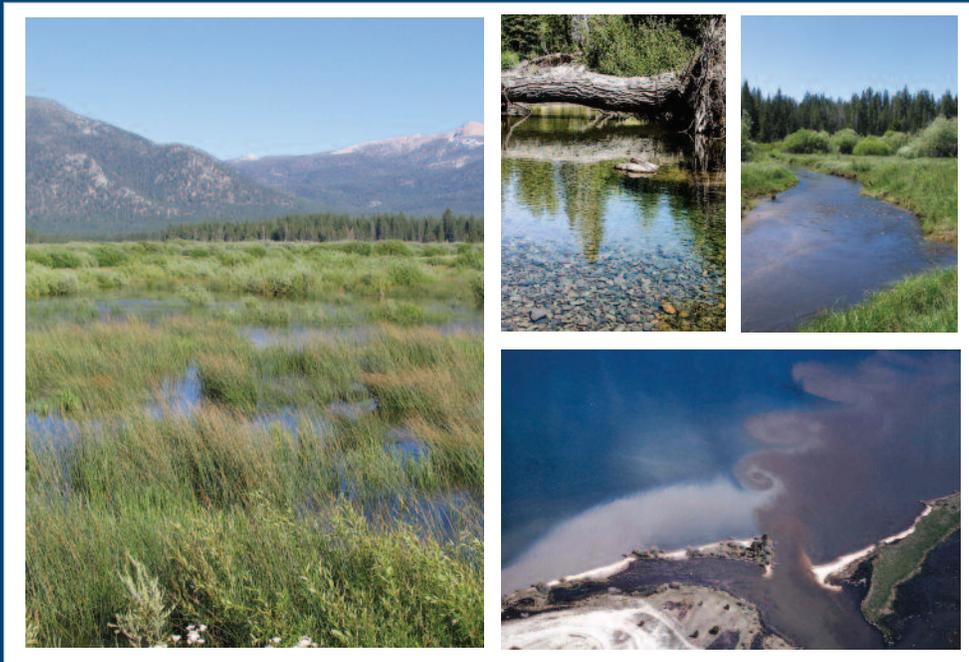
## TRANSPORTATION AND ACCESS

In rural destinations similar to Lake Tahoe where large population bases are within a few hours by car, transportation is the largest contributor to the release of GHG. To address these effects, Basin communities and recreational destinations should be served by a centrally-managed transportation system. Consolidation of automobile travel for both visitors and commuters should be facilitated by various transportation options. Complete streets are a solution for connecting revitalized mixed-use centers, nodes, and neighborhoods. These streets would be tailored to meet the needs of each community. Other neighborhood specific solutions would include improved sidewalks and trail connections. This shift in travel patterns would provide multiple environmental improvements to air and water quality and reduced GHG. Improved connections and mobility options would help to reduce traffic volumes, year-round mobility, and an enhanced visitor experience.

### Actions

- Invest in environmentally-friendly transportation for public fleets
- Reduce dependence on the automobile by providing increased transportation options
- Improve the Basin's transit systems and reduce vehicle miles traveled (VMT) through Basin-wide bike trails, improved transit options, and waterborne transit networks
- Encourage pedestrian/transit-oriented redevelopment to reduce GHG emissions and VMT
- Shift to more efficient modes of transportation to improve quality of life while reducing GHG emissions
- Centralize cost-effective parking to encourage walking, bicycling, and local transit use which addresses specific needs of each Basin community
- Design complete streets to integrate pedestrian and non-auto-oriented facilities to reduce automobile traffic and related emissions, increase pedestrian safety, and provide opportunities for community interaction.

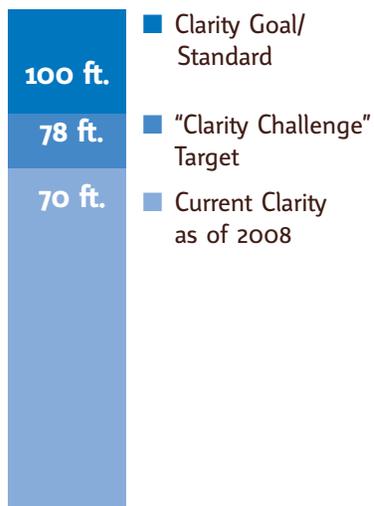




## WATERSHEDS, HABITAT, & WATER QUALITY

LAKE TAHOE OWES ITS REMARKABLE CLARITY TO SEVERAL FACTORS, including its great depth, volume, and the clean and clear runoff that flows into the Lake from the granitic soils and wetlands of its surrounding watersheds. Though Lake Tahoe’s waters remain pure compared to most water bodies, clarity has declined over the past 40 years.

### LAKE TAHOE CLARITY GOAL



The 1960 Squaw Valley Olympics spurred a building boom throughout the Tahoe Basin which continued throughout the 1970s. This building frenzy resulted in a precipitous decline in the Lake’s clarity because of increased runoff of fine sediment, nitrogen, and phosphorus into the Lake.

Everyone has a role to play in restoring Lake clarity—residents, visitors, businesses, and public agencies all share in the responsibility. By reducing erosion and restoring the health of the Basin’s watersheds, EIP water quality and watershed projects are the key to restoring the Lake’s breathtaking clarity.

# Stormwater Management

## STORMWATER MANAGEMENT PROGRAM

To date, EIP partners have invested more than half of EIP funds on projects to restore Lake clarity. Most projects addressed erosion control and source runoff improvements, as well as the implementation of Best Management Practices (BMPs) on developed properties. Because roadway runoff is one of the primary causes of clarity loss, two-thirds of the water quality projects under the updated EIP focus on stormwater management. EIP partners will prioritize stormwater treatment in urban core areas since these areas are the primary source of fine sediment loading into the Lake.

### Primary Threshold Categories Improved by Program Objectives

 Water Quality	 Recreation
 Air Quality	 Fisheries and Wildlife
 Soil Conservation	 Noise
 Scenic Quality	 Vegetation

### Program Elements

The goal of the stormwater management program is to reduce the amount of fine sediment particles entering Lake Tahoe. Stormwater management consists of the following four programs:

- Reducing Stormwater Pollution from City and County Roads
- Reducing Stormwater Pollution from State Highways
- Reducing Stormwater Pollution from Forest Roads
- Retrofitting Public and Private Facilities with Best Management Practices

Stormwater management projects incorporate stormwater drainage conveyance, treatment facilities, and source control measures for effectively reducing runoff and improving Lake water quality. Property/easement acquisitions and public-private partnerships are important elements of these projects because in many cases sufficient space does not exist within road rights-of-way for water quality projects to be constructed. Improved project level monitoring will help evaluate the effectiveness of different stormwater strategies and improve project implementation in the future. For example, studies are underway to explore area-wide runoff treatment systems which could be used in the future.

### Adapting to Climate Change

Climate change and water quality models for the Lake Tahoe region predict that as more precipitation falls as rain rather than snow, peak stormwater flows may increase. As a result, EIP water quality and erosion control projects may need to be designed for larger winter runoff and peak flows.

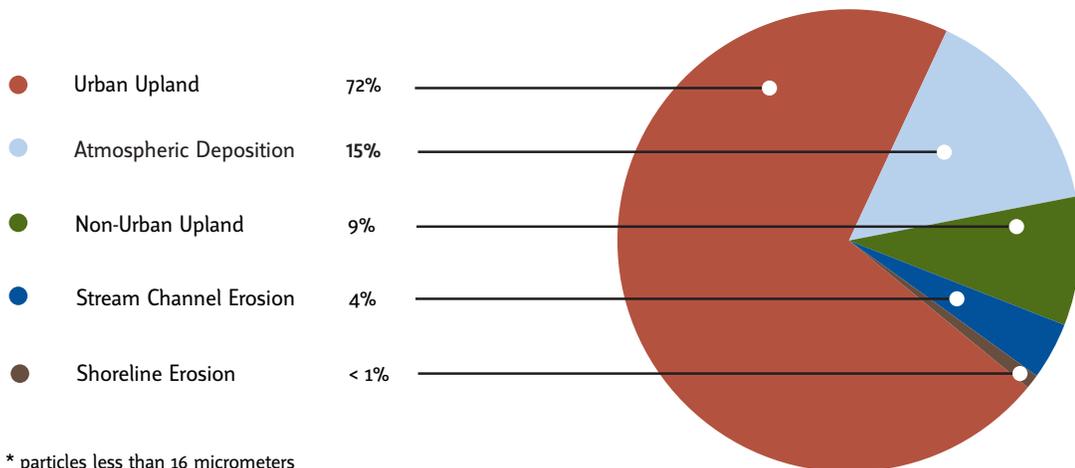
# Science Drives Water Quality Program

**TMDL:** The Total Maximum Daily Load is a water quality restoration plan led by the states of California and Nevada, to determine the maximum amount of pollutants that Lake Tahoe can absorb while meeting water quality standards. The EIP Update relies on science gleaned from the TMDL effort to prioritize water quality programs and projects.

The Lake Tahoe TMDL water quality restoration plan reflects a \$10 million investment in the work of more than 200 professionals and scientists who have analyzed 40 years of data on the Lake and its tributaries. Scientists developed two models: the watershed and the clarity models. The three primary pollutants causing clarity loss in Lake Tahoe are nitrogen, phosphorus, and fine sediment particles. The watershed model identifies the sources of these pollutants by land-use category and helps guide the community and decision makers in implementing informed policy choices and assessing the cost-effectiveness of implementation strategies.

The bottom line: fine sediment particles are the number one culprit in the clarity loss equation. As shown below, 72 percent of these particles are coming from developed areas. Roads and other impervious areas act both as sources of pollutants, and as conveyor belts, depositing fine sediments into the Lake from urban upland areas. These lands cover less than five percent of the land area in the Tahoe Basin. Reducing the amount of fine sediment particles entering the Lake has the most potential for helping to reverse clarity loss. The TRPA Regional Plan Update, which includes the EIP, will contain implementation strategies, including regulations and incentives, to achieve an interim clarity target of about 80 feet. To reach this clarity target, EIP partners must take actions to achieve a 34 percent reduction in fine sediment particles from 2004 levels as well as reductions in nitrogen and phosphorus. This target is an important EIP goal and will be challenging. However, for the first time ever, we know it's scientifically possible and recent clarity data show we're moving in the right direction.

**SOURCES OF FINE SEDIMENT PARTICLES ENTERING LAKE TAHOE \***



\* particles less than 16 micrometers

Figure courtesy of the Lahontan Regional Water Quality Control Board and the Nevada Division of Environmental Protection.



## REDUCING STORMWATER POLLUTION FROM CITY AND COUNTY ROADS

### PRIMARY IMPLEMENTING AGENCIES:

City of South Lake Tahoe, Douglas County and General Improvement Districts, El Dorado County, Placer County, Washoe County

There are more than 550 miles of local roads in the Tahoe Basin and most were developed without curbs, gutters, or other streetscape improvements to capture fine sediment and other pollutants before they reach Lake Tahoe. Reducing runoff from these roads is a top priority of the City of South Lake Tahoe and each of the five counties surrounding the Lake. Erosion control projects and advanced treatment methods are implemented to reduce both the volume of water running off these roadways, and the amount of fine sediment, nitrogen, and phosphorus discharging into Lake Tahoe.

On the California side of the Basin, there are 423 miles of county and city streets. On the Nevada side, there are 140 miles of county streets. Roadways transport polluted stormwater into streams, roadside ditches, and other areas which ultimately drain into Lake Tahoe. Sand and cinders applied to roads during winter months contribute additional fine sediments to stormwater. Local governments are developing advanced treatment methods to meet water quality goals and projects to reduce the volume of water running off these roadways and the amount of fine sediment and other pollutants they transport into the Lake.

### Goal

To reduce erosion and stormwater runoff from local roads.



Municipal stormwater systems can help reduce pollution at the Lake by capturing and filtering runoff.

### Priority Projects

- Curbs, gutters, rock-lined channels, bioswales, infiltration basins and other improvements that capture runoff from developed neighborhoods
- Pump and treatment facilities, where necessary, may be implemented to address area-wide runoff
- Acquisitions of property and easements beyond the right-of-way to more effectively reduce or treat runoff
- Monitoring and assessment programs to evaluate the effectiveness of control measures
- Operations and maintenance activities to maintain performance of facilities.

### Accomplishments to Date

To date, EIP partners have retrofitted 323 miles of county and city roads with stormwater quality improvements.

### Unfunded Need for Reducing Stormwater from City and County Roads (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$81.92	\$82.63	\$20.09	\$48.79	n/a	\$233.43

These shares represent the capital improvement costs only and future operating and maintenance costs for the local jurisdictions are projected to be an additional \$18.5 million. A private share is not included since these projects are located along public roadways. However, private sector contributions for water quality improvement total \$204.8 million and are identified in the BMP Retrofits on Private and Public Parcels program.



# REDUCING STORMWATER POLLUTION FROM STATE HIGHWAYS

## PRIMARY IMPLEMENTING AGENCIES:

California Department of Transportation, Nevada Department of Transportation

**W**ater volume and stormwater runoff from state highways is a major contributor to Lake Tahoe's clarity decline. The Lake Tahoe TMDL identifies the pressing need to address this runoff in order to achieve water quality standards at Lake Tahoe. The California Department of Transportation (Caltrans) and Nevada Department of Transportation (NDOT) projects will reduce both the volume of water and the amount of fine sediment, nitrogen, and phosphorus from the state highway network that drains into Lake Tahoe.

There are more than 100 miles of state highways within the watershed. Of this, 64 miles are on the California side of Lake

Tahoe, and 40 miles on the Nevada side. Because state highways typically are much wider than local roads, they produce greater volumes of stormwater runoff per mile of road than do local streets. Caltrans and NDOT also apply large quantities of sand and cinders to highways during

winter months to help prevent vehicle accidents. Although street sweepers are used on roadways to capture these abrasives, large quantities still end up in the Lake.

### Goal

To reduce erosion and stormwater runoff from state highways.

## Priority Projects

- Curbs, gutters, rock-lined channels, bioswales, infiltration basins and other improvements that capture runoff from the highway corridor
- Pump and treatment facilities where necessary to address area-wide runoff



Many of the Basin's roads and highways drain directly into the Lake and require water treatment upgrades.

- Acquisition and easements of property beyond the right-of-way to more effectively reduce or treat runoff
- Reductions and improved collections of sand and cinders applied in winter months
- Monitoring and assessment programs to evaluate the effectiveness of these projects
- Operation and maintenance activities to maintain their optimal performance.

TMDL science identified stormwater treatment throughout the road network as imperative to achieving water quality standards at Lake Tahoe

## Accomplishments to Date

To date, 26 miles of California and Nevada highways have been retrofitted with BMPs. In the next decade, Caltrans and NDOT intend to treat most of the rest of the state highway network in the Basin.

### Unfunded Need for Reducing Stormwater from State Highways (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$36.6	\$27.44	\$46.4	n/a	n/a	\$110.44

Funding responsibility for this program is primarily assumed by federal and state entities. The federal share includes the different funding programs of the Federal Highway Administration (FHWA). Local and private funding contributions for stormwater management are shown in other program areas.



# REDUCING STORMWATER POLLUTION FROM FOREST ROADS

**PRIMARY IMPLEMENTING AGENCIES:**  
US Forest Service

The National Forest road network at Lake Tahoe provides important forest management and recreational access to National Forest System Lands. Many of these roads are not paved, however, and contribute dust and stormwater runoff to Lake Tahoe and its tributaries. This program includes retrofit and/or removal of certain roads to reduce stormwater runoff. National Forest System Lands in the Tahoe Basin are managed by the Lake Tahoe Basin Management Unit and contain approximately 240 miles of forest system roads. Some of these forest roads are located in sensitive areas with steep slopes. Others are

located near streams and water bodies. Runoff from these roads erodes hillsides and drains into Lake Tahoe. The US Forest Service uses a systematic approach in managing runoff from these roads.

## Goal

To reduce erosion and stormwater runoff from Forest Service roads.

The focus of this program is to implement water quality projects that incorporate drainage conveyance and treatment facilities as well as source control measures and stream-crossing improvements.

## Priority Projects

- Installing rock-lined roadside channels, replacing culverts at stream crossings, building infiltration basins and other treatment facilities, vegetating hillsides, and other stormwater improvements
- Decommissioning roads which no longer serve important recreational or forest management uses.



Roads on forest lands are retrofitted with erosion control measures under the EIP.

## Accomplishments to Date

The US Forest Service has decommissioned approximately 160 miles of roads since 1998 in the Lake Tahoe Basin, reducing the road network from 400 to the current 240 miles. Of these 240 miles, more than 80 miles has been retrofitted with water quality Best Management Practices. Numerous stream crossings have been reconstructed with larger drainage pipes or bridges. Four bridges have been constructed to restore healthier stream function.

### Unfunded Need for Reducing Stormwater from Forest Roads (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$7.17	n/a	n/a	n/a	n/a	\$7.17

Forest roads in this program are associated with the National Forest system roads and all resources dedicated to this effort are currently designated as a federal share. State, local and private contributions toward reducing stormwater from forest roads are captured in other program areas.



## RETROFITTING PUBLIC AND PRIVATE FACILITIES WITH BEST MANAGEMENT PRACTICES

### PRIMARY IMPLEMENTING AGENCIES:

Private Property Owners, Local Government Jurisdictions, Nevada Tahoe Conservation District, Public Land Management Agencies, Tahoe Resource Conservation District

**R**unoff from public and private developed land is one of the largest sources of fine sediment and other pollutants in Lake Tahoe. Most of the rain and snow that falls on impervious surfaces on these lands (i.e., rooftops, driveways and parking areas) runs off and flows into roadside drainage channels. This runoff then combines with stormwater from public roads to produce a large volume of water containing nitrogen, phosphorus, and fine sediment that drains into the Lake.

Best Management Practices (BMPs) are the first line of defense to reduce stormwater runoff from developed properties. They include vegetating bare soils, building infiltration trenches, paving dirt roads and driveways, and other improvements that capture and reduce runoff to adjacent roads or properties.

*Goal*  
To reduce erosion and stormwater runoff from public and private facilities.

The Regional Plan for the Lake Tahoe Basin adopted by TRPA requires all public and private property owners to install BMPs on their lands and facilities. This investment is the largest source of the private share of EIP funding.

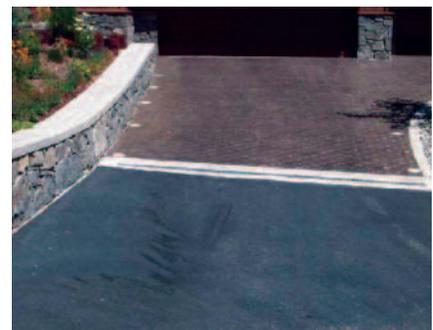
The focus of this program is retrofitting developed public and private land with erosion control measures, known as BMPs, in order to help keep runoff from entering roadways and ultimately Lake Tahoe.

### Priority Projects

- Assisting public and private property owners with BMP inspections, installations, and certifications
- Establishing public outreach programs to educate homeowners and businesses
- Developing incentives and other strategies to integrate water quality BMPs with defensible space requirements
- Coordinating and integrating residential BMPs with city and county stormwater improvement projects.

### Accomplishments to Date

As of December 31, 2008, 10,457 properties, or roughly 25 percent of the 43,470 residential, commercial, and industrial parcels in the Basin, have been retrofitted with BMPs. In Nevada, the compliance rate is 46 percent overall, with a 50 percent compliance rate in the Priority One Watershed area of Incline Village. In California, however, only 16 percent of the parcels have been retrofitted.



These examples show completed erosion control work on residential parcels.

### Unfunded Need for BMP Retrofits on Private and Public Parcels (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$60.4	\$16.81	\$1.6	\$14.4	\$204.8	\$298

All entities have a responsibility to implement BMPs on their facilities to improve water quality by addressing stormwater flows.

# Watershed Management

## WATERSHED MANAGEMENT PROGRAM

The Lake Tahoe Basin's watersheds and stream environment zones have been significantly impacted by growth and development. The watershed management program is an integrated approach designed to improve Lake clarity, restore stream environment zones, and make progress on vegetation, soils, wildlife and fisheries environmental threshold standards. Restoration of these riparian areas is essential to improve Lake clarity by filtering runoff.

Many of the Lake Tahoe watersheds and aquatic habitats are degraded. Many streams no longer function properly as a result of past or ongoing human activities. Poorly functioning streams contribute significant quantities of sediment and nutrients to the Lake. Land use practices within watersheds have also led to increased sedimentation and stream channel alteration which has damaged aquatic habitats.

EIP partners will assess watershed conditions to identify and prioritize individual projects. In most watersheds, projects are needed to improve the geomorphic function and floodplain connectivity of streams. Projects are designed to replenish overdrafted groundwater tables and restore native vegetation, as well as implementing BMPs to reduce sediment and nutrient loading in non-urbanized sections of watersheds. EIP projects also focus on enhancement of specific aquatic habitat types or the processes that create and maintain those habitat types. Projects will remove, improve, or replace structures such as culverts, dams, or bridges that create movement barriers for aquatic species or reduce the hydrologic function of streams. Revegetation is needed to stabilize stream banks and restore floodplains. Public acquisition of sensitive lands will help ensure that private development does not disproportionately impact the watershed. These restoration projects benefit all environmental thresholds and are the most cost-effective methods to reduce pollutant loading to the Lake, according to TMDL data.

### Primary Threshold Categories Improved by Program Objectives

- |   |  |
|---|--|
|  Water Quality     |  Recreation             |
|  Air Quality       |  Fisheries and Wildlife |
|  Soil Conservation |  Noise                  |
|  Scenic Quality    |  Vegetation             |

Individual watersheds have been prioritized based on the degree to which they are degraded and the extent to which they pollute Lake Tahoe as indicated by the Lake Tahoe TMDL Technical Report. On the California side, tributaries depositing the most sediment into Lake Tahoe are the Upper Truckee River, Blackwood Creek, and Ward Creek. On the Nevada side, high-priority creeks and watersheds with similar types of degradation are targeted for restoration: Third, Rosewood, and Edgewood Creeks. In addition to physical management of watersheds, the EIP includes programs for public acquisition of environmentally sensitive land in multiple watersheds.

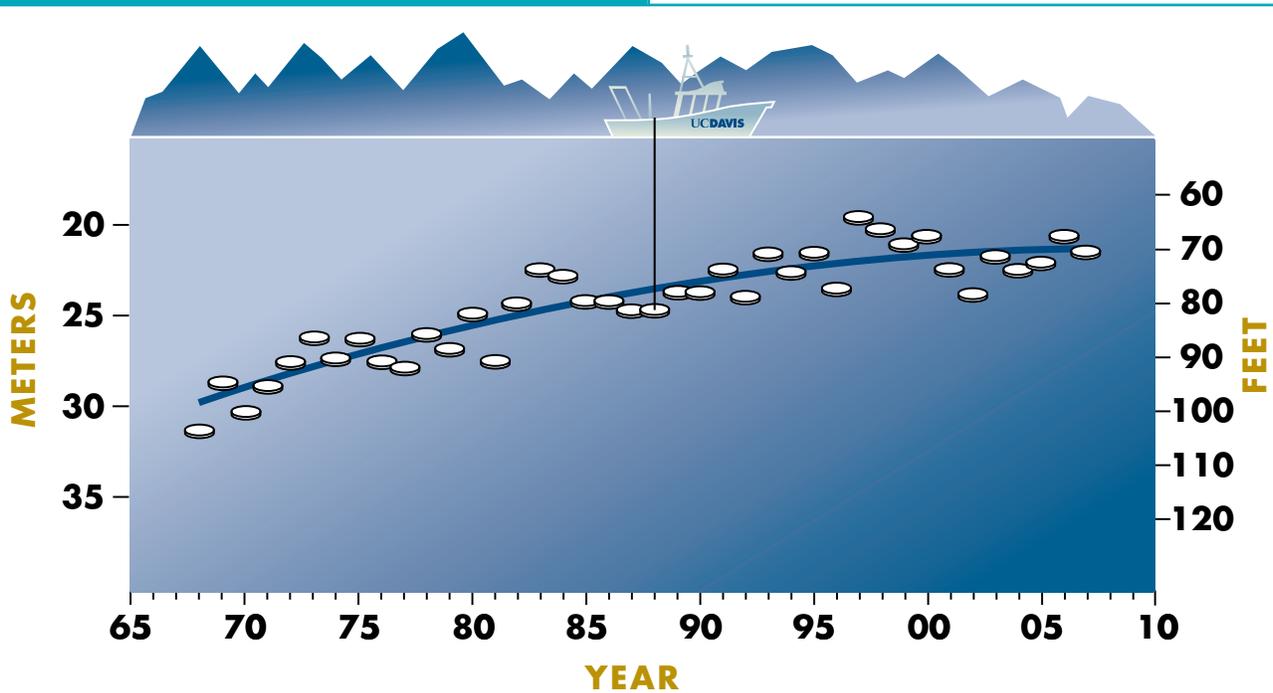
### Program Elements

- Restoring the Upper Truckee Watershed
- Restoring California Priority Watersheds
- Restoring Nevada Priority Watersheds
- Enhancing Fish and Wildlife Habitat
- Acquiring Environmentally Sensitive Land

### Adapting to Climate Change

Climate change and water quality models for the Lake Tahoe region predict that as more precipitation falls as rain rather than snow, peak flows may occur earlier and with higher frequency. As a result, EIP watershed management projects may need to be designed for increased winter runoff, changing hydrology, and changes to soils, vegetation, and habitat resources.

WATER CLARITY TREND AT LAKE TAHOE 1968-2007



Data Source: Annual Secchi Disk Measurements, UC Davis, Tahoe Environmental Research Center.

**Secchi disk:** Named for Father Pietro Angelo Secchi, an astronomer among the first to test the instrument when he lowered it into the Mediterranean Sea in 1865. At present, UC Davis researchers test Lake Tahoe's clarity every 7-10 days year-round by submerging the Secchi disk into the water and recording the depth at which the disk disappears.



## RESTORING THE UPPER TRUCKEE WATERSHED

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California State Parks, City of South Lake Tahoe, El Dorado County, US Forest Service

The Upper Truckee watershed is the largest in the Tahoe Basin, draining more than 54 square miles. Urbanization within this watershed has disturbed its natural ability to filter pollutants before they make their way into Lake Tahoe. As a result, the watershed is the single largest source of fine sediment and nutrients flowing into Lake Tahoe, annually transporting some 2,078 tons of sediment, or about two-thirds of the total amount reaching the Lake.

The Upper Truckee watershed was once a major fishery supporting Lahontan Cutthroat Trout (LCT) and mountain whitefish. This fishery has been replaced by introduced species, including rainbow, brown, and brook trout. River and stream fish habitat is in poor condition because of the influx of sediment, loss of riparian plant cover, reduction in macroinvertebrate populations and stream-channel widening.

Structures such as bridges and culverts have created barriers to fish migration, preventing fish access to several miles of remaining spawning habitats in the upper watershed. The US Forest Service, the Army Corps of Engineers, the California Tahoe Conservancy, California State Parks, and the City of South Lake Tahoe are developing a large-scale restoration program to restore the natural channels and floodplains of the Upper Truckee River. This collaborative, interagency effort is one of the largest and most extensive watershed restoration efforts in the Basin.

*Goal*  
To restore or enhance the natural functions and processes of the Upper Truckee River and its connecting floodplain.



The Upper Truckee River is the number one contributor of fine sediments to Lake Tahoe.

### Priority Projects

- Upper Truckee Marsh
- Airport Reach
- Meadow Reach
- Sunset Reach
- Golf Course Reach

### Accomplishments to Date

Completed projects include the restoration of Dunlap, Cold, Angora, Industrial, and Trout Creeks and portions of the Upper Truckee River.

Unfunded Need for Restoring the Upper Truckee Priority Watersheds (in millions)					
Federal	State of CA	State of NV	Local	Private	Total
\$32.85	\$40.7	n/a	n/a	n/a	\$73.55

Federal and state partners will restore the vitality of Lake Tahoe through land conservation, acquisitions, and restoration projects within the Upper Truckee Watershed. The Upper Truckee Watershed is located in California and therefore no cost share for Nevada is shown. Determinations of local and private shares occur at the project level and will be reported as projects are implemented.



## RESTORING CALIFORNIA PRIORITY WATERSHEDS

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California State Parks, City of South Lake Tahoe, El Dorado County, Placer County, US Forest Service

In addition to restoring the Upper Truckee River watershed, EIP partners are also working to restore several other high priority watersheds on the California side of the Basin that support fish and wildlife habitat. These watersheds have altered hydrologic function and contribute high levels of fine sediment and other pollutants to Lake Tahoe. Projects are prioritized based on the highest level of environmental benefit and cost effectiveness.

### Priority Projects

- Blackwood Creek, which covers 11 square miles on the west side of the Tahoe Basin and is the highest per-acre contributor of fine sediments and nutrients to Lake Tahoe
- Ward Creek, a 10-square mile watershed and the third highest contributor of runoff to the Lake
- The Meeks Creek watershed covers 8.8 square miles on the west shore and is a major contributor of nutrients and sediments to Lake Tahoe
- SEZs within Taylor, Tallac, and Spring Creek watersheds along the south shore which are heavily impacted by grazing, logging, road construction, and other physical and structural developments.

### Goal

To restore or enhance the natural functions and processes of streams and their floodplains in CA priority watersheds.



Cove East Restoration Project, South Lake Tahoe, CA.

### Accomplishments to Date

The US Forest Service has completed several projects on the **Blackwood Creek watershed** to remediate the effects of gravel mining adjacent to the stream channel, and to replace an under-sized bridge that created a barrier to fish migration and hydrologic function.

EIP partners completed a comprehensive watershed assessment of **Ward Creek watershed** to develop restoration plans and priorities, and removed a dam that had been a major barrier to fish passage.

The US Forest Service completed a comprehensive assessment of **Meeks Creek and Cold Creek watersheds**, and are now planning and implementing restoration improvements.

### Unfunded Need for Restoring California Priority Watersheds (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$27.36	\$22.42	n/a	n/a	n/a	\$49.78

Funding responsibility for this program is primarily assumed by federal and state entities. However, there may be opportunities for local and private involvement as projects are further scoped and defined and those contributions will be reported as projects are implemented.



## RESTORING NEVADA PRIORITY WATERSHEDS

### PRIMARY IMPLEMENTING AGENCIES:

Incline Village General Improvement District, Nevada Division of State Lands, Nevada State Parks, Nevada Tahoe Conservation District, Washoe County

Several Nevada watersheds are high priorities for restoration. The interruption of natural hydrologic processes and the resulting influx of nutrients and sediment have degraded the quality of these watersheds and have impacted water quality, fisheries, stream environment zones and wildlife habitat. Other impacts such as logging, grazing, road construction, residential and commercial development, recreational roads and trails, golf courses and ski resorts have also contributed to the degradation of these watersheds.

### Goal

To restore or enhance the natural functions and processes of streams and their floodplains in NV priority watersheds.

The focus of this program is to improve water quality; restore natural biological, physical, and chemical processes in streams, SEZs and floodplains; and improve the aquatic wildlife habitat. Watershed assessments will continue to be used to identify and prioritize projects.

### Priority Projects

These watershed restoration projects would help restore fish and wildlife habitat, filter pollutants, and capture and treat runoff. Runoff from these watersheds is a major contributor of fine sediment that affects Lake clarity.

- Burke Creek
- Edgewood Creek
- Incline Creek
- North Canyon Creek
- Third Creek



### Accomplishments to Date

EIP partners have completed restoration projects on Second Creek, Rosewood Creek and Incline Creek. In addition, partners developed a watershed plan for the Edgewood Creek watershed which identifies future restoration opportunities.

At left: Water quality projects like this one in Incline Village, NV strive to achieve multiple environmental benefits for Lake Tahoe. At right: Flow measurement device at Village Green Pond, Incline Village, Nevada.

### Unfunded Need for Restoring Nevada Priority Watersheds (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$3.25	n/a	\$9.9	n/a	n/a	<b>\$13.15</b>

Funding responsibility for this program is primarily assumed by federal and state entities. However, there may be opportunities for local and private involvement as projects are implemented.



## ACQUIRING ENVIRONMENTALLY SENSITIVE LANDS

PRIMARY IMPLEMENTING AGENCIES:  
California Tahoe Conservancy, US Forest Service

Public acquisition and restoration of sensitive lands serves as a tool to help accomplish the EIP goals of protecting and maintaining watersheds and providing recreational opportunities in the Tahoe Basin. Since 1982, the US Forest Service, California Tahoe Conservancy, and Nevada Division of State Lands have acquired and protected more than 20,000 acres of sensitive lands, comprised of more than 10,000 vacant lots in residential areas throughout the Basin. By acquiring sensitive lands, these agencies have

preserved open space, created water quality benefits, provided alternatives to landowners who are unable to develop these lands, and protected the integrity of cultural and historic resources.

The focus of this program is to protect and enhance meadows, wetlands, rivers, streams; to provide a land base

for stormwater quality projects; and to reduce the development potential within the Lake Tahoe Basin by approximately 20 percent. Additionally this program will increase public ownership and access to the shoreline of Lake Tahoe while protecting and enhancing scenic resources.

### Priority Projects

- EIP partners are continuing to seek opportunities, on a willing-seller basis, to purchase environmentally sensitive lands that would further the goals of the EIP
- Priorities include parcels in key watersheds and in undeveloped subdivisions.

### Accomplishments to Date

Since 1997, more than 3,092 acres have been acquired by state and federal agencies in the Basin. Significant acquisitions during this period include more than 300 acres and 2,600 feet of lakefront at the Upper Truckee Marsh, more than 1,800 acres associated with High Meadows and recently 754 acres surrounding Incline Lake in Nevada.

#### Goal

To acquire and restore priority environmentally sensitive lands.



Restored meadows and wetlands like these provide critical habitat for wildlife and benefit water quality.

### Unfunded Need for Acquiring Environmentally Sensitive Lands (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$47.6	\$19.33	n/a	n/a	n/a	\$66.93

Currently, only the state of California and the federal government have acquisition programs in place. Nevada acquisitions are largely completed.



## ENHANCING FISH AND WILDLIFE HABITAT

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, Nevada Division of Wildlife, Nevada Tahoe Resource Team, US Fish & Wildlife Service, US Forest Service

The Tahoe Basin contains a rich diversity of fish, wildlife, and native plants that are an integral part of the ecosystem at Lake Tahoe. Land development and road construction have impacted and modified the natural landscape in the Basin, reducing, fragmenting, and degrading habitat and migration corridors for these species. Today's forested landscapes are overstocked, composed primarily of second-growth trees and lack the diversity needed to support healthy wildlife populations. As a result,

### Goal

To enhance fish and wildlife lake habitat associated with fish and wildlife movement corridors.

wildlife species in the Lake Tahoe Basin are being impacted by a loss of habitat including key habitat types necessary for food, cover or reproduction.

This program will focus on enhancing the biologic integrity of ecosystems to improve the environmental conditions necessary for the full range of

species to help compensate for past degradation. EIP partners will coordinate fish and wildlife habitat enhancement projects with vegetation and forest fuels management projects to ensure that multiple environmental benefits can be gained. Priorities will be based on: type of habitat to be restored, potential for further degradation, status of species likely to benefit, compatibility with other EIP programs, and cost effective implementation.

### Priority Projects

- Acquiring and protecting a wide variety of habitat types
- Removing and/or rerouting roads and trails
- Creating wildlife connectivity corridors surrounding urbanized areas



Survival of the Northern Goshawk requires careful habitat protection at Lake Tahoe.

- Reestablishing and creating migration corridors
- Increasing the diversity of forest vegetation.

### Accomplishments to Date

EIP partners have enhanced 13,450 acres of valuable wildlife habitat and protected 606 acres of critical habitat through public acquisition.



The old-forest dependent California Spotted Owl is listed as a "Sensitive Species" by the US Forest Service. Forest treatments implemented in the Basin are designed to promote habitat conditions important for this species.

### Unfunded Need for Enhancing Fish and Wildlife Habitat (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$4.09	\$3.85	\$1.76	n/a	n/a	\$9.7

Funding responsibility for this program is primarily assumed by federal and state entities as most opportunities exist on public land. Enhancing both fish and wildlife habitat are often components of larger watershed restoration or forest management activities. Determinations of local and private shares occur at the project level and will be reported as projects are implemented.

# *Threatened, Endangered, and Sensitive Species*

## THREATENED, ENDANGERED, AND SENSITIVE SPECIES PROGRAM

The Lake Tahoe Basin is home to many special status plant and animal species, including federal, state, and regionally listed threatened, endangered, or petitioned species. These species are considered sensitive because of low population sizes or distribution, declining abundance, or other factors that place them in peril. EIP partners will seek to protect and expand (in appropriate locations) habitats of special status species populations and communities of concern to improve the habitats and environmental conditions these species require.

### Program Elements

EIP projects will enhance all 21 special status species in the Tahoe Basin. The primary focus will be:

- Implementing the Tahoe Yellow Cress Conservation Plan
- Restoring and Recovering Lahontan Cutthroat Trout
- Protecting Other Priority Sensitive Species

### Primary Threshold Categories Improved by Program Objectives

 Water Quality	 Recreation
 Air Quality	 Fisheries and Wildlife
 Soil Conservation	 Noise
 Scenic Quality	 Vegetation

### Adapting to Climate Change

Climate change models for the Lake Tahoe region predict that in the future more precipitation will fall as rain rather than snow. This may cause changes to the terrestrial and aquatic habitats that support Tahoe Yellow Cress, Lahontan Cutthroat Trout, and other priority sensitive species. As a result, the programs that support these species may need to change management strategies to meet this additional challenge.



# IMPLEMENTING THE TAHOE YELLOW CRESS RECOVERY PLAN

## PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, Nevada and California State Parks, Nevada Division of Forestry, Private Property Owners, US Fish & Wildlife Service, US Forest Service

Lake Tahoe is the only place in the world where the Tahoe Yellow Cress (TYC) species (*Rorippa subumbellata*) is located. This rare plant grows along the shoreline and is listed as critically endangered by the state of Nevada, endangered by the state of California, and is a candidate for federal listing under the Endangered Species Act. Because of concern for this unique species, multiple agencies collaborated on a conservation plan in 2002. The TYC Conservation Strategy serves as guidance for all research, protection and conservation activities for the species. The primary objective of this program is to de-list TYC through the development of additional conservation measures and mitigation techniques.

*Goal*  
To protect and conserve Tahoe Yellow Cress.

## Priority Projects

- Protecting current populations and their habitats from disturbance
- Conducting research that supports the management and restoration of TYC
- Establishing new areas that could support additional populations
- Implementing other activities consistent with the TYC Conservation Strategy.

## Accomplishments to Date

EIP partners and other entities completed and adopted a conservation strategy in 2002. Based on that strategy, agencies have implemented conservation measures, identified additional key research and management questions, and developed an adaptive-management program to measure the effectiveness of implementation activities. EIP partners have also conducted experimental reintroductions. Because of these efforts, existing TYC populations are protected and new populations are growing.



Reestablishment of sensitive plants such as the Tahoe Yellow Cress pictured here is a top priority of the EIP.

Unfunded Need for Implementing Tahoe Yellow Cress (in millions)					
Federal	State of CA	State of NV	Local	Private	Total
\$0.72	\$0.8	\$0.1	n/a	n/a	\$1.62

Funding responsibility for this program is primarily assumed by federal and state entities while recognizing that the opportunities for restoration activities would also affect a combination of both public and private lands. Any local or private funds expended as part of this programmatic implementation would be documented and reported as projects are implemented.



## RESTORING AND RECOVERING LAHONTAN CUTTHROAT TROUT

PRIMARY IMPLEMENTING AGENCIES:  
US Fish & Wildlife Service, US Forest Service

The Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*) once flourished in Lake Tahoe's waters, but no populations have been found in the Lake since the 1930s. The species is federally listed as threatened under a special rule that permits recreational harvest under state fishing regulations. The Lahontan Cutthroat Trout (LCT) Recovery Plan, finalized in 1995, provides a framework for reintroduction and recovery activities.

The focus of this program is to restore and recover a self-sustaining lake form of Lahontan Cutthroat Trout in Lake Tahoe and Fallen Leaf Lake. The reestablishment of the LCT will support a popular recreational fishery in the Basin.

### Priority Projects

- Maintaining and evaluating the successful reintroduction of the LCT in the Upper Truckee River and Fallen Leaf Lake
- Conducting additional research to evaluate the most promising means of reintroduction to Lake Tahoe
- Other activities consistent with the Lahontan Cutthroat Trout Recovery Plan.

#### *Goal*

To restore and recover a self-sustaining lake form of Lahontan Cutthroat Trout in Lake Tahoe and Fallen Leaf Lake.



It is important that native fish populations once again take hold in the Tahoe Basin.

### Accomplishments to Date

The Lahontan Cutthroat Trout has been successfully reintroduced into the Upper Truckee River and Fallen Leaf Lake, and is currently maintained by hatchery propagation of a strain of the fish that originates from the indigenous Lake Tahoe population. EIP partners completed the first phase of research in Fallen Leaf Lake as identified in the LCT Recovery plan.

### Unfunded Need for Restoring and Recovering Lahontan Cutthroat Trout (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$18.06	\$2.86	n/a	n/a	n/a	\$20.92

The state of California and the federal government will implement the Lahontan Cutthroat Trout Recovery Plan. Shares for the state of Nevada, local and private sectors are not identified.



## PROTECTING OTHER PRIORITY SENSITIVE SPECIES

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California State Parks, Nevada Division of State Lands, Nevada Department of Wildlife, US Forest Service

The Lake Tahoe Basin provides habitat for numerous other priority and special status species. Protecting, enhancing, and restoring these species and their habitats is a high priority for EIP partners in achieving the environmental standards of the Lake Tahoe Regional Plan.

Other priority and special status species to be addressed include, but are not limited to:

- California spotted owl (*Gambelia silus*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Osprey (*Pandion haliaetus*)
- Lake Tahoe draba (*Draba asterophora*)
- Mountain beaver (*Aplodontia rufa*)
- Trowbridge's shrew (*Sorex trowbridgii*)
- Northern goshawk (*Accipiter gentilis*)
- Native amphibians including the mountain yellow-legged frog (*Rana muscosa*)
- Migratory birds and other native mammals, such as American marten.

The focus of this program is to protect species by implementing conservation measures, acquiring important habitat and managing human disturbances and impacts.



Osprey at Lake Tahoe.

### Priority Projects

- Acquiring and protecting a wide variety of habitat types
- Removing and/or rerouting roads and trails
- Creating wildlife connectivity corridors surrounding urbanized areas
- Reestablishing and creating migration corridors
- Increasing the diversity of forest vegetation.

### Accomplishments to Date

EIP projects have rerouted trails on public lands to reduce impacts on sensitive species. Restoration in stream environment zones and other areas has increased habitat quality and the protection of breeding sites continues.

**Bald eagles have consistently nested on the shoreline of Lake Tahoe over the last 10 years.**

*Goal*  
To protect critical habitat needed by other sensitive species



Unfunded Need for Protecting Other Priority Sensitive Species (in millions)					
Federal	State of CA	State of NV	Local	Private	Total
\$4.85	\$2.32	\$0.68	n/a	n/a	\$7.85

Funding responsibility for this program is primarily assumed by federal and state entities. Enhancing both fish and wildlife habitat for the protection of sensitive species is often a component of larger watershed restoration or forest management activities. Although not anticipated, local and private shares would be reported as projects are implemented.

# *Invasive Species*

## INVASIVE SPECIES PROGRAM

Invasive species pose a major threat to ecosystem health in the Tahoe Basin. Past resource management practices, including fire suppression, grazing, development, and logging have significantly altered native habitats. In their altered state, ecosystems are less able to support wildlife and are unable to adequately respond to natural or imposed disturbances.

These degraded ecosystems face a growing threat from invasive species, which can replace native species, alter natural balances and significantly reduce habitat for other plant and animal species. The environmental and economic impacts of these invasions could be substantial as they crowd out native populations, impair habitats and water quality, and reduce recreational opportunities.

The primary focus of this program is to improve the biological integrity of ecosystems in the Basin, and in doing so ensure the existence of a full range of native species, seral stages, habitats, and ecological processes. Achieving these goals will require a coordinated effort between multiple entities to reduce impacts from non-native species, reduce direct human impacts on wildlife and increase species richness and diversity.

### Primary Threshold Categories Improved by Program Objectives

- |   |  |
|---|--|
|  Water Quality     |  Recreation             |
|  Air Quality       |  Fisheries and Wildlife |
|  Soil Conservation |  Noise                  |
|  Scenic Quality    |  Vegetation             |

### Program Elements

EIP partners and public stakeholders will work together to control terrestrial invasive species, and to manage existing and prevent future infestations of aquatic invasive species. The program focus will be:

- Controlling Terrestrial Invasive Species
- Managing Aquatic Invasive Species

### Adapting to Climate Change

Warming Lake waters and ambient air temperatures are presenting new challenges to managing terrestrial and aquatic invasive species. Climate may increase growth rates of species in the region, as well as increasing the number of potential invaders. For these reasons, climate change will play an important role in this program.



## CONTROLLING TERRESTRIAL INVASIVE SPECIES

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, Nevada Tahoe Conservation District, Private Property Owners, Tahoe Resource Conservation District, US Forest Service, US Fish & Wildlife Service

**I**nvasive weeds are a threat to Lake Tahoe's flora, fauna, and water quality. The potential for invasions is high in the Basin because of its shared state border and travel corridors, construction and road maintenance activities, and the seasonal influx of tourists. Once established, noxious and invasive weeds reduce land and recreational values, degrade water quality and wildlife habitat.

### Goal

To protect the biological diversity of the Lake Tahoe Basin from terrestrial invasive species.

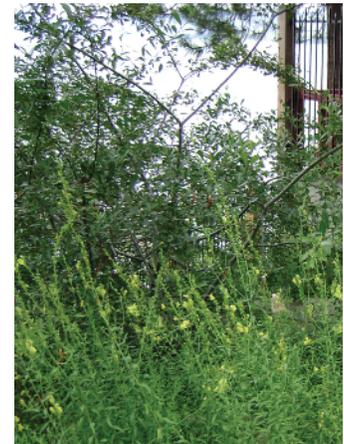
Because the Lake Tahoe Basin is in the relatively early stages of infestations by noxious and invasive weeds, early detection and rapid response are essential to reduce the cost and effort of later removing established populations.

The focus of this program is to have an integrated and collaborative approach to identify, map, manage and eradicate

noxious and invasive weeds within the Lake Tahoe watershed. A diverse partnership of agencies and community members, known as the Lake Tahoe Basin Weeds Coordinating Group is instrumental in coordinating this program and implementing on-the-ground projects.

### Priority Projects

- Detection and mapping of historical and new infestations
- Control and eradication programs
- Education and outreach.



Terrestrial invasive species pose a major threat to Lake Tahoe. At left: Bull Thistle, invasive weed. At right: Toad flax.

### Accomplishments to Date

- EIP partners completed detection surveys on 1,880 miles of roads and more than 8,000 acres of public and private lands, including 3,100 acres in the Angora Fire burned area. An additional 520 sites have been monitored, including historical and new infestation sites.
- EIP partners treated 9 net acres in 2006 to eradicate invasive weeds and 21 net acres in 2007, which have substantially decreased new areas requiring treatments.
- EIP partners reached more than 5,600 people in 2008 via trainings, presentations, events, radio spots, mailings and workshops, and launched a new website in 2009.
- 380 homeowners received on-site consultations on invasive plants from local conservation districts. Additionally, EIP partners distributed 6,200 weed brochures throughout the Tahoe Basin.

### Unfunded Need for Controlling Terrestrial Invasive Species (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$1.19	\$0.75	\$0.36	n/a	n/a	\$2.3

Funding responsibility for this program is primarily assumed by federal and state entities while recognizing that opportunities for treatment on private lands will be captured and private funds reported.



## MANAGING AQUATIC INVASIVE SPECIES

### PRIMARY IMPLEMENTING AGENCIES:

Nevada Division of State Lands, Private Property Owners, Tahoe Resource Conservation District, US Forest Service, US Fish & Wildlife Service

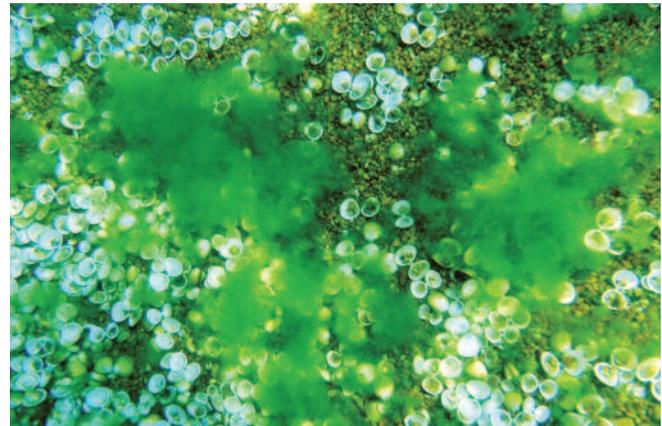
**A**quatic invasive species pose one of the most serious threats to Lake Tahoe and also to adjacent lakes Fallen Leaf, Echo, Marlette, and Cascade. Such species can be extremely detrimental to native species in addition to threatening water quality. There are currently large infestations of noxious weeds in the Lake including Eurasian water milfoil and curlyleaf pondweed. Additionally, researchers have recently discovered large concentrations of the Asian clam in multiple locations in Lake Tahoe.

Recent detections of quagga and zebra mussels in the Western United States also pose a significant threat to Lake Tahoe. These introductions could have enormous environmental and economic impacts in the Basin. Aggressive measures are in place to reduce the risk that they will be introduced into the Lake. Agencies implemented a mandatory watercraft inspection program in 2008. High risk watercraft must be decontaminated before launching into Lake Tahoe and boat ramps are closed when inspectors are not present. Additionally, outreach and education programs inform the public about what they can do to prevent invasive species introductions.

The focus of this program is preventing new introductions of aquatic invasive species and managing negative impacts from existing invasive species within the Lake Tahoe Basin.

### Priority Projects

- Keeping quagga mussels out of Lake Tahoe with an aggressive watercraft inspection and enforcement program
- Preventing new introductions of aquatic invasive species into Lake Tahoe
- Limiting the spread of existing invasive species such as the Asian clam while minimizing impacts to native species
- Abating harmful ecological, economic, social and public health impacts resulting from aquatic invasive species.



Asian clam beds like this one are a growing concern at Lake Tahoe.

### Accomplishments to Date

EIP partner agencies developed a comprehensive Lake Tahoe Region Aquatic Invasive Species Management Plan. The states of California and Nevada endorsed the plan which was then approved by the Federal Aquatic Nuisance Species Task Force.

*Goal*  
To protect the biological diversity and scenic resources of the Lake Tahoe Basin from aquatic invasive species.

A treatment program for Eurasian watermilfoil and curlyleaf pondweed is currently in place and a pilot project assessing remediation methods for Asian clams is underway.

Extensive public outreach regarding existing aquatic invasive species infestations and education on clean boating practices is ongoing.

### Unfunded Need for Managing Aquatic Invasive Species (in millions)

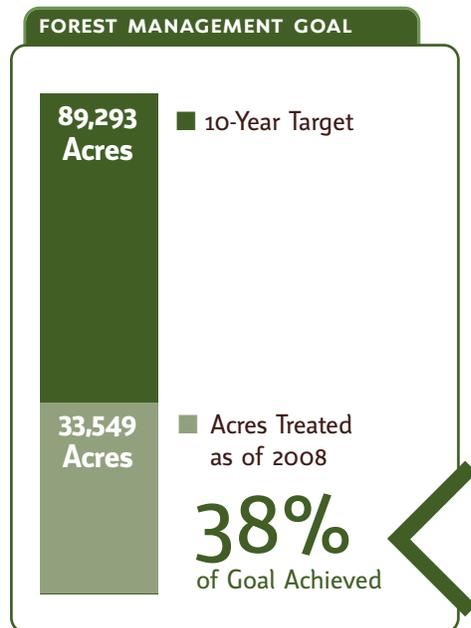
Federal	State of CA	State of NV	Local	Private	Total
\$6.31	\$3.34	\$1.08	\$1.08	\$5.94	\$17.75

All EIP partners are investing in the protection of Lake Tahoe from aquatic invasive species.



## FOREST MANAGEMENT

AFTER DECADES OF FIRE SUPPRESSION, THE TAHOE BASIN'S overstocked forests are highly vulnerable to insect, disease and catastrophic wildfire, and lack the diversity in species and age structure to support a healthy forest ecosystem. The EIP Forest Management program will improve the ecological health of Lake Tahoe's forests, reduce the buildup of forest fuels, and encourage the utilization of wood biomass.



Logging at Lake Tahoe beginning in the mid-1800s, ensuing fire suppression practices, and lack of active forest management have created overstocked forests. Overcrowding has made forests susceptible to drought stress, disease, and insect attacks, all of which have caused many of the Basin's trees to die. While low intensity wildfire is necessary for a healthy forest, the existing density and buildup of fuels can lead to catastrophic wildfires that threaten life, property, Lake clarity, scenic values, and wildlife habitat.

## HISTORY OF THE LAKE TAHOE BASIN FOREST

The forests of today are a legacy of the choices made only 150 years ago—just a small fraction of time in Lake Tahoe’s life span.

The discovery of silver in Virginia City brought early European settlers into the Tahoe Basin and touched off drastic changes to the forest. Clear cutting in parts of the Basin bared the hills, and without roots to hold the soil in place, massive erosion brought sediment rushing into the Lake. This sediment clouded the crystal clear waters and altered the fragile balance between the Lake and its surrounding ecosystem.

After exhausting timber resources, the loggers moved on and vegetation slowly returned to Tahoe’s hillsides. Unfortunately, because so many trees were cut at once, the natural regeneration and fire suppression actions that followed produced a different forest than in the pre-logging and mining era. The Tahoe Basin’s trees are two to six times denser than a healthy forest with a substantially higher proportion of white fir, and a lower proportion of fire resistant and drought tolerant Jeffrey Pine. This species mix contributes to a much heavier fuel concentration and poses a threat of catastrophic fire, which in turn increases the risk of property loss, and threatens human safety, Lake clarity, forest vegetation, and wildlife habitat.

Today, the EIP Forest Management Program focuses on forest thinning within the Wildland Urban Interface (WUI), biomass utilization where appropriate, and the implementation of the 10-Year Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy which includes community wildfire protection plans.



**1870:** Loggers begin to clear cut forests of Tahoe.



**1870-1900:** Two-thirds of the forest was cut and shipped to the Comstock Lode.

# Forest Health and Hazardous Fuels

## FOREST ECOSYSTEM HEALTH AND HAZARDOUS FUELS REDUCTION

The Forest Ecosystem Health and Hazardous Fuels Reduction program will make Lake Tahoe's forests more resilient to catastrophic wildfire and improve their ability to respond to natural disturbances. EIP partners will achieve these goals by restoring forests to more natural densities, age structure, and species composition while preserving and enhancing ecosystem values. Utilization of biomass may help reduce greenhouse gas emissions and create alternative energy in the process. EIP partners will design projects to achieve multiple environmental benefits such as reducing fuel loading while improving riparian vegetation and overall ecosystem health.

### Primary Threshold Categories Improved by Program Objectives

- |   |  |
|---|--|
|  Water Quality     |  Recreation             |
|  Air Quality       |  Fisheries and Wildlife |
|  Soil Conservation |  Noise                  |
|  Scenic Quality   |  Vegetation            |

### Program Elements

The EIP Forest Management activities are focused in the following areas:

- Advancing Forest Ecosystem Health and Reducing Hazardous Fuels
- Utilizing Biomass from Forest Fuels Reduction.

### Adapting to Climate Change

Lake Tahoe's forested landscapes offer the potential to both mitigate and adapt to the threats of climate change. The EIP Forest Management projects will be designed to:

- Increase the storage of carbon in the Tahoe Basin's forests
- Reduce the risk of catastrophic wildfires, a major source of greenhouse gas emissions
- Encourage the use of biomass to supplement pile burning of forest wood waste and to generate alternative energy
- Grow forests that are resilient to climate change
- Design habitat improvement projects to take into account the potential changes in the type, location and distribution of vegetation communities.



## ADVANCING FOREST ECOSYSTEM HEALTH AND REDUCING HAZARDOUS FUELS

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California State Parks, Local Fire Districts/Agencies, Nevada Division of Forestry, Nevada Division of State Lands, Nevada Fire Safe Council, Private Property Owners, US Forest Service

Catastrophic wildfire poses a serious threat to life, property and the Lake Tahoe Basin's environment. The 10-Year Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy states that current wildland fuel conditions within the Lake Tahoe Basin could support high-intensity wildfires that are very difficult to suppress. In addition, values uniquely associated with the Tahoe Basin are also at risk. These include commercial and public infrastructure, the clarity and beauty of Lake Tahoe and its scenic landscapes, its tourism-based economy and the ecological values of its surrounding forests. Several plant communities are of special concern because of their rarity, importance to a large number of species, declining abundance, or reduced distribution. Preservation and enhancement of these plant communities (including aspen stands, late seral stage conifer forests, cushion plant communities, and fens) are central to sustain the biological integrity of the Basin's ecosystems.

The focus of this program is to manage and enhance forest ecosystem health while reducing hazardous fuels that pose a serious threat to life, property and the Lake Tahoe environment in a manner consistent with achieving environmental thresholds. The fuel treatment prescriptions for the general forest are designed to modify fire intensity and spread while reducing high density stands and insect infestation and disease in treated areas. Emphasis in these areas is on landscape-scale fire modification.

Forest areas adjacent to urban areas are the most critical areas on which to focus fuel reduction work. Fuels treatments reduce the threat to developed areas from wildland fire and reduce the potential of structure fires from spreading into the open forest.

Forest management projects will be prioritized based on the 10-Year Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy. Factors affecting prioritization include: fire regime condition class, degree of change from historical conditions, potential for further degradation if project is not initiated, compatibility with other EIP programs, cost-effectiveness, and likelihood that implementation will be successful.

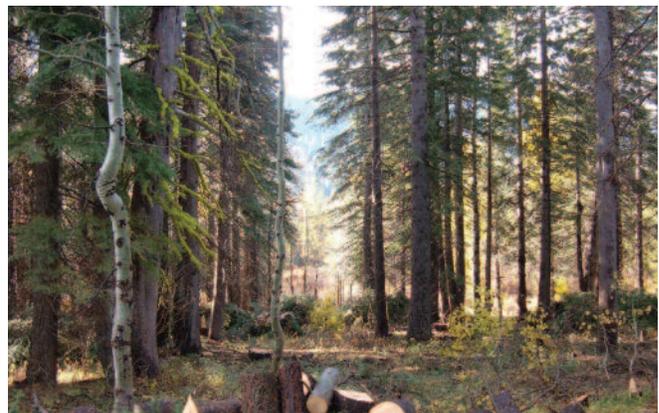
*Goal*  
To protect forest ecosystem health and reduce forest fuels.

### Priority Projects

- Forest thinning and prescribed fire to reduce hazardous fuels and to enhance underrepresented species or achieve desired densities or age structures
- Enhance and preserve plant communities of special concern (including aspen stands, late seral stage conifer forests, cushion plant communities, and fens) because of their rarity, importance to a large number of species, declining abundance, or reduced distribution



Before treatment.



After initial treatment (future fuels and restoration projects will occur).

- Stream environment zone restoration and enhancement projects
- Activities intended to mimic fire or other natural disturbance regimes at the appropriate magnitude, extent, and frequency
- Appropriate use of landscape design to buffer sensitive areas
- Propagation, planting, or other techniques to increase the extent and vigor of underrepresented plant species
- Forest management projects on thousands of publicly-owned urban lots throughout the Basin.

### Accomplishments to Date

More than 96 acres of old growth forests have been protected or enhanced while approximately 240 acres of disturbed lands have been re-vegetated. Forest fuels reduction work has been completed on more than 33,549 acres, and hand crews have treated urban lots covering over 1,500 acres. Treatment methods include chipping, mastication, and burning.

The Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy was completed, and the Multi Agency Coordination Group (MAC) was established to facilitate the implementation of the strategy. The Tahoe Fire and Fuels Team completed hazardous fuels reduction activities on over 1,500 acres in 2008 and 50 projects totalling 2,000 acres in 2009.



Slaughterhouse Canyon Fuels Reduction Project before treatment.

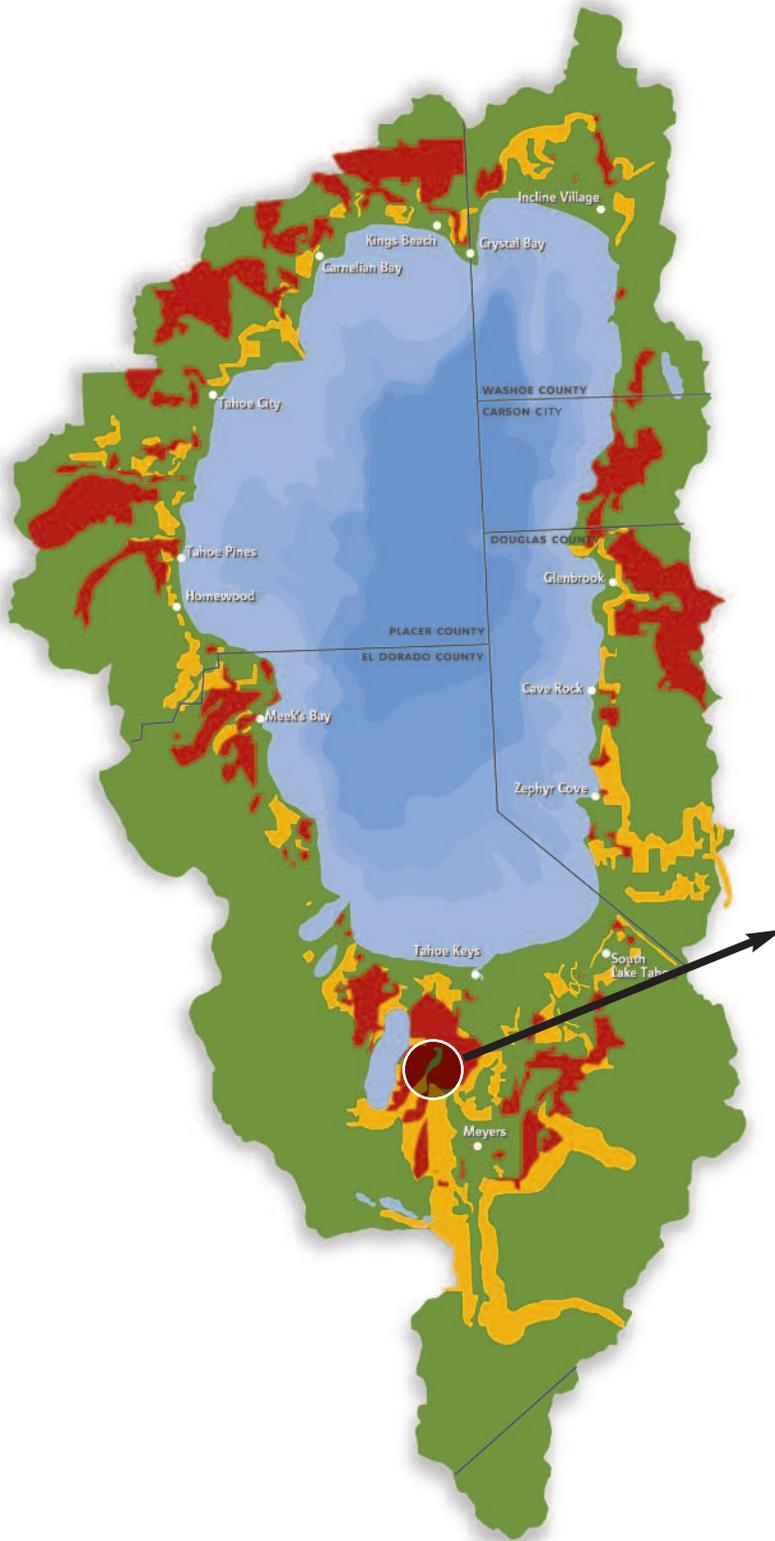


Slaughterhouse Canyon Fuels Reduction Project after treatment.

Unfunded Need for Advancing Forest Ecosystem Health and Reducing Hazardous Fuels (in millions)					
Federal	State of CA	State of NV	Local	Private	Total
\$82.14	\$31.93	\$4.36	\$16.35	\$58.86	\$193.64

The implementation of the 10-Year Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy is a high priority for all EIP funding partners.

## FUELS TREATMENTS COMPLETED AND FUTURE ACREAGE TARGETS



- 21,293 acres of fuels treated as of December 2006
- 68,000 acres planned for fuels treatments from 2008-2018

### ANGORA WILDFIRE JUNE 2007:

The devastation caused by the Angora Wildfire underscores the urgent need for fuels reduction at Lake Tahoe. An illegal campfire started the blaze which burned 3,100 acres and destroyed more than 245 homes and structures. Tahoe Basin fire organizations, land management agencies, and private property owners are implementing the Multi-Jurisdictional Fuels Reduction and Wildfire Prevention Strategy over the next 10 years which will help reduce the risk of future catastrophic wildfires. A post-fire Forest Service analysis demonstrated fuels treatments in and around the Angora burn area moderated the fire behavior. These treatments provided firefighters safer areas to fight the wildfire, and as a result, helped save many homes from destruction.



## UTILIZING BIOMASS FROM FOREST FUELS REDUCTION

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, Nevada Division of State Lands, Nevada Fire Safe Council, Placer County, US Forest Service

**H**azardous fuel reduction projects are designed to reduce the potential of catastrophic fire, protect valuable assets at risk and restore forest health. Forest management and thinning projects in the Tahoe Basin generate wood waste biomass that is typically chipped, masticated or left in the forest for pile and/or broadcast burning. Smoke from burning impacts air quality, contributes to an

increase in nutrient loading to Lake Tahoe, creates greenhouse gases, and generates concerns from adjacent residents. Providing some of this material to biomass facilities in or near the Basin could have several impor-

tant benefits including improvements in air quality, reduction of greenhouse gas emissions that impact public health and Lake clarity, and production of alternative energy.

Current estimates indicate that the Basin's initial treatment of forest fuels reduction projects could provide approximately 12,500 green tons of biomass annually.

This program will focus on the development of cost-effective methods for utilizing and transporting wood waste material into a viable energy source. Biomass utilization opportunities will be considered in hazardous fuels reduction and forest health projects.

### Priority Projects

- Utilizing biomass on existing treated public and private lands
- Linking forest health treatments to biomass energy production.



Chip storage facilities like this one in Douglas County are possible because of EIP partnerships.

### Accomplishments to Date

Agencies have prepared several preliminary assessments of biomass potential in and around the Lake Tahoe Basin and biomass projects are currently underway. For example, Placer County has helped local residents collect and remove biomass from private lands. Similarly the Nevada Tahoe Conservation District (NTCD) coordinated a multi-partner effort to establish a biomass transfer station on the south shore of Lake Tahoe.

The NTCD facilitated this collaborative project with the Nevada Division of Forestry, Tahoe Douglas Fire Protection District, Nevada Fire Safe Council, Douglas County Sewer Improvement District, and the Tahoe Regional Planning Agency. The transfer station serves homeowners by having a drop off point for fire defensible space project debris. Chips are transported to the Nevada biomass cogeneration plant operated by the Nevada Department of Corrections.

### Unfunded Need for Utilizing Biomass from Fuels Reduction (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$7.1	\$1	\$0.9	\$1	n/a	\$10

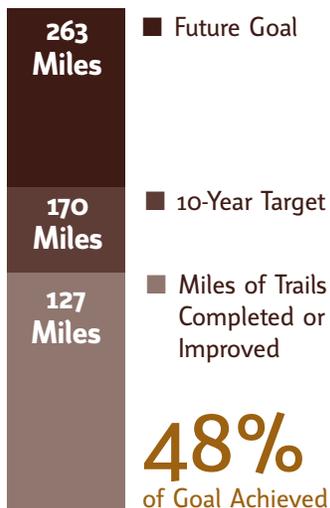
Funding responsibility for this program is primarily assumed by federal and state entities while recognizing that opportunities for treatment on private lands will be captured and reported.



## AIR QUALITY & TRANSPORTATION

LAKE TAHOE IS LOCATED IN THE SIERRA NEVADA MOUNTAINS, within driving range of three large urban centers: The San Francisco Bay Area, the Sacramento Valley, and the Reno metropolitan area. Visitors from these areas come to Lake Tahoe predominantly by automobile. Locally-produced pollution degrades Tahoe’s air quality. Sources include engine exhaust, wood smoke, road dust, and particulate matter from construction dust.

### BIKE AND PEDESTRIAN TRAILS



Mobile sources of air pollution, mainly motor vehicles, are among the most significant sources of pollution and greenhouse gases in the Tahoe Basin. Pollutants from all sources can land on the Lake’s surface, affecting water clarity. When pollutants are trapped near the surface of the Lake during a thermal inversion event, the rate of deposition is greater.

More than half of the nitrogen that enters the Lake annually—218 metric tons—is deposited through the atmosphere. One quarter of the phosphorus and 15% of the overall fine sediment particles entering Lake Tahoe drop from the air. To reduce the ever-growing impact of transportation on Lake Tahoe’s air quality, numerous EIP projects have focused around transit and pedestrian projects.

# Air Quality and Transportation

## IMPROVING AIR QUALITY AND TRANSPORTATION PROGRAM

Most of the air pollution impacting visibility, human, and ecosystem health at Lake Tahoe originates within the Basin and half of the regional air quality standards are out of attainment.

### Program Elements

The goal of the Air Quality and Transportation program is to reduce harmful emissions from wood heaters, to reduce residents' and visitors' dependency on the private automobile, and to remove fine sediment particles from roadway surfaces before they enter Lake Tahoe. Air quality and transportation activities consist of the following programs:

- Improving Air Quality by Reducing Wood Smoke and Dust
- Improving Transit and Trail Connections.

#### Primary Threshold Categories Improved by Program Objectives

 Water Quality	 Recreation
 Air Quality	 Fisheries and Wildlife
 Soil Conservation	 Noise
 Scenic Quality	 Vegetation

Providing financial incentives through matching funds or voucher programs will help accelerate the replacement of non-compliant wood burning fireplaces and stoves that are direct sources for air pollution. Acquiring high efficiency street sweepers will help remove fine particles from roadways before they become airborne. Removing fine particles from roadways will also benefit water quality.

Finding ways to reduce the dependency on the automobile by building bike trail networks, improving transit systems, and rehabilitating existing transportation networks to support walkable communities are strategies that will improve air quality.

### Adapting to Climate Change

Improving mobility and access to and around Lake Tahoe will be a major focus of the Basin's efforts to reduce greenhouse gas emissions that contribute to global climate change. The EIP air quality and transportation projects will be designed to mitigate the impacts of climate change by:

- Creating a coordinated regional highway, transit, and parking system
- Improving bicycle and pedestrian connections between neighborhoods and communities
- Increasing the use of alternative fuels in vehicles and the public transportation fleet
- Developing Basin-wide bike trail and waterborne transit systems.



## IMPROVING AIR QUALITY

### PRIMARY IMPLEMENTING AGENCIES:

California Department of Transportation, Local Government Jurisdictions, Nevada Department of Transportation, Private Property Owners

**A**irborne particulate matter has become a significant concern because of its negative effects on human and ecosystem health and visibility in the Tahoe Basin. The primary sources of airborne particulate matter in the Basin are road dust, de-icing practices, snow removal, the burning of wood products, construction dust, and vehicle exhaust. Although the air quality in the Basin is considered better than most of the urban areas that

surround it, the Basin remains in non-attainment with some of the air quality standards set by federal, state, local or regional agencies.

Through this program, EIP partners will implement innovative technologies and incentives to reduce the amount of particulate pollution. The primary pollutants of

concern for air quality include ozone (O<sub>3</sub>), carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), particulate matter less than 10 microns (PM<sub>10</sub>) and particulate matter less than 2.5 microns (PM<sub>2.5</sub>).

### Goal

To improve air quality by reducing wood smoke and dust.



Recent science shows that high efficiency street sweepers can significantly reduce particulate matter before it becomes airborne.

### Priority Projects

- Acquiring high efficiency street sweepers and developing a monitoring program to evaluate and quantify effectiveness
- Developing an incentive program to encourage the replacement of non-compliant wood stoves and fireplaces.

### Accomplishments to Date

While agencies in the Basin currently operate a limited sweeper program, it is not sufficient to adequately control particulates. Regulations are in place requiring the removal or replacement of polluting wood stoves, however, additional incentives are needed to achieve air quality goals.



### Unfunded Need for Improving Air Quality (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$0.4	\$0.4	n/a	\$2.4	\$4.8	\$8

Currently the majority of funding for this program is the responsibility of the local and private share. California and Nevada provide funding for air quality improvements through support of bike trails in the Improving Transit and Trail Connections program area.



## IMPROVING TRANSIT AND TRAIL CONNECTIONS

### PRIMARY IMPLEMENTING AGENCIES:

Local Government Jurisdictions, California Tahoe Conservancy, California Department of Transportation, Nevada Department of Transportation, Nevada Division of State Lands, North Lake Tahoe Resort Association, Tahoe Transportation District, US Forest Service

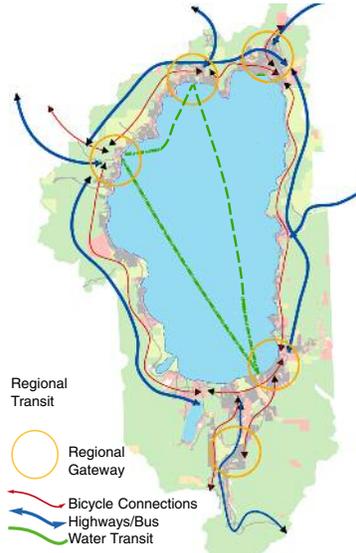
The Lake Tahoe Basin is socially and economically dependent on recreation and tourism. Rapid growth in population centers outside the Basin such as Sacramento, Sierra Foothills, and Reno promises increased demand for Lake Tahoe as a vacation getaway.

Traffic congestion and the resulting pollution are significant concerns. Access to transit, bicycle, and walking facilities is limited and many users do not consider existing modes of transportation viable alternatives to the automobile. Currently, transit connections between the north and south shore communities are limited and difficult to navigate for passengers. In addition to the inconvenience of traffic, the environmental impacts of congestion are a major concern to the fragile ecosystems surrounding Lake Tahoe. Vehicle emissions and road dust are significant factors in air and water pollution. Traffic delays contribute to high levels of carbon monoxide in populated areas as well as frustrating visitors in their Lake Tahoe vacation experience.

Currently, the Tahoe Region is served primarily by two publicly operated transit systems. On the south shore, public transit service is provided by BlueGO, which is operated through a cooperative transit partnership involving the City of South Lake Tahoe, South Shore casino and resort properties, El Dorado and Douglas Counties, Heavenly Mountain Resort, and The Ridge Resorts. At the north end of the Lake, Placer County operates the Tahoe Area Regional Transit (TART) system. Both transit systems have struggled with a lack of adequate operating and capital funds.

The Lake Tahoe Basin also has an extensive system of bicycle facilities; however, the bicycle system is incomplete, lacking key connections between communities. In the Basin's developed areas, the highway network lacks sidewalks, bike lanes, landscaping, lighting and other features that would facilitate the development of pedestrian, bike-friendly and transit-oriented communities.

The focus of this program is to reduce negative environmental impacts and provide high levels of mobility to visitors and residents, and to develop a well-connected, well-functioning



*Goal*  
To improve air quality in the Lake Tahoe Basin.

Improved connections and mobility options are important for reducing traffic volumes, creating year-round mobility, and enhancing the visitor experience.

multi-modal transportation system. This goal will be accomplished by increasing public transportation use to connect existing transit services within the Tahoe Basin as well as providing convenient transit services to and from surrounding communities. Building bike trails and bike lanes also plays a role in reducing the dependency on the automobile as mandated in the Bi-State Compact. In addition, upgrades to regional roadways are needed.

TRPA, acting as the Regional Transportation Planning Agency and the Tahoe Metropolitan Planning Organization (TMPO) established regional priorities through the Regional Transportation Plan, which identified the following priority projects.

### Priority Projects

#### Regional Transit Enhancement Strategies

- Enhancing BlueGo, TART, and other transit services
- Building and maintaining adequate levels of transit shelters
- Supporting regional efforts to extend California's Capitol Corridor service from Sacramento and Roseville to Reno

### Unfunded Need for Improving Transit and Trail Connections (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$63.82	\$82.86	\$5	\$14.26	\$5.14	\$171.08

Investments by EIP partners leverage scarce funds which deliver environmental benefits in addition to air quality.

- Increasing connections between Carson City and South Lake Tahoe
- Re-examine North-South Shore transit connections.

### Bicycle and Pedestrian Connections

- Completing the Class I (off-road) bike trail network on the west and north shores from Sugar Pine Point to Kings Beach
- Launching the Stateline to Stateline bike trail in Nevada
- Completing the South Tahoe Greenway and other segments in South Lake Tahoe
- Adding Class II (on-road) bike lanes on the Basin's highway network.

### Transportation Improvements

- **U.S. Highway 50 Pedestrian & Bicycle Improvements Project:** The goal of this project is to improve the character of the highway by making the corridor pedestrian and bicycle friendly. New features will include water quality improvements, landscaping and lighting to create a more aesthetically pleasing section of roadway.
- **U.S. Highway 50 Stateline Corridor Project:** This project realigns U.S. 50 and spans South Lake Tahoe, CA and Stateline, NV. Lake Parkway would be expanded to accommodate traffic through the area. The project will improve mobility while balancing transportation needs with community goals of economic vitality and environmental preservation.

- **Fanny Bridge/SR 89 Realignment Project:** This project addresses traffic congestion during the summer months, the need for seismic safety improvements, and a transit and parking facility south of Fanny Bridge.
- **State Route 28/Kings Beach Commercial Core Improvements:** This project will improve water quality treatment facilities, increase bicycle and pedestrian mobility, enhance the scenic and aesthetic character of the Kings Beach Commercial Core, and improve safety with additional parking and a pedestrian crossing.
- **Tahoe City Transit Center:** This project will enhance opportunities for residents, commuters, and visitors to use public transit services in North Tahoe.
- **Lake Tahoe Waterborne Transit:** Waterborne transit would create a transit option that is an attractive alternative to the automobile and can be initiated in an efficient, environmentally, and cost-effective manner.

### Accomplishments to Date

Within the last decade, EIP partners have constructed 127 miles of bike trails and pedestrian facilities. In addition, partners have constructed or rehabilitated 29 transit facilities to increase ridership.

The US Forest Service has increased ridership on the Emerald Bay Trolley (South Shore to Emerald Bay) from 21,634 passengers in 2005 to 42,003 passengers in 2007. Ridership on the Emerald Bay Shuttle (Tahoe City to Emerald Bay) started in 2006 with 4,011 passengers and increased in 2007 to 7,802 passengers.



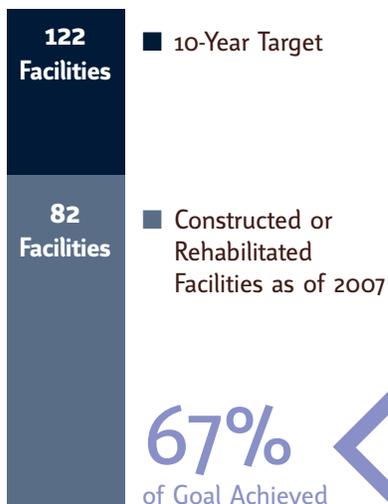
Above: Lake Tahoe on a poor visibility day. At left: Trail projects, such as the Lakeside Trail at Fanny Bridge, promotes biking which in turn can reduce vehicles on the road, improve air quality, and enhance visibility.



## RECREATION & SCENIC RESOURCES

LAKE TAHOE'S MAJESTIC BEAUTY, PROXIMITY TO URBAN AREAS, and renowned recreational opportunities attract more than three million visitors annually. From enjoying Lake access on shorelines to world-class skiing to the solitude of back-country trails, residents and visitors from around the world enjoy Lake Tahoe's diverse recreational offerings. The EIP Recreation and Scenic Programs will protect and improve these opportunities for generations to come.

### RECREATION PROJECTS



During the first 10 years of the EIP, programs focused on the acquisition of land, access to the Lake, and retrofitting recreation facilities to enhance the public's recreational experiences and to help achieve and maintain recreation environmental thresholds.

EIP funds have brought additional acres of natural lands and miles of Tahoe's shoreline into public ownership and enabled the implementation of new Lake access, developed facilities, and recreational trails. These programs have helped protect Tahoe's fragile natural resources from overuse and protected its unique scenic resources.

# Recreation

## RECREATION PROGRAM



The Bi-State Compact emphasizes protecting, preserving, and enhancing the nationally significant recreational values of the Tahoe Basin, with an emphasis on increasing public access to Lake Tahoe and its shoreline. Lake Tahoe’s abundant recreational opportunities serve residents and visitors from around the world, and provide for a \$1.5 billion annual visitor-serving economy. Well-planned, designed, and coordinated recreation facilities are needed to provide high-quality visitor experiences while protecting Tahoe’s unique natural resources.

The EIP has focused on bringing additional acres of natural lands and miles of Tahoe’s shoreline into public ownership and enabled the implementation of new beach access, developed and retro-fitted facilities, and recreational trails. However, public access and recreation facilities are overcrowded in many areas and remain limited in others creating a strain on fragile natural resources.

### Primary Threshold Categories Improved by Program Objectives

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Water Quality     | <input checked="" type="checkbox"/> Recreation             |
| <input checked="" type="checkbox"/> Air Quality       | <input checked="" type="checkbox"/> Fisheries and Wildlife |
| <input checked="" type="checkbox"/> Soil Conservation | <input checked="" type="checkbox"/> Noise                  |
| <input checked="" type="checkbox"/> Scenic Quality    | <input checked="" type="checkbox"/> Vegetation             |

### Program Elements

The primary elements of the EIP Recreation Program include:

- Improving Lake Access
- Developing a Comprehensive Trail System
- Improving Recreation Facilities
- Improving Educational Programs and Interpretive Facilities.

### Adapting to Climate Change

Public access and recreation projects are the foundation of the Basin’s green economy. To support Lake Tahoe’s increased focus on eco-tourism, EIP recreation projects may enhance overcrowded recreation facilities, increase public access to the Lake, improve educational and interpretative facilities, and enhance the scenic quality of roadways and shoreline. These and other initiatives will help create a sustainable environment and economy in the Tahoe Basin.



## IMPROVING LAKE ACCESS

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, Local Government Jurisdictions and Utility Districts, US Forest Service

Public access to Lake Tahoe’s shoreline represents one of the Basin’s most significant recreational opportunities. The public’s ability to access the Lake Tahoe shoreline is constrained by the limited number of facilities and beach opportunities which operate at or above capacity during summer peak periods. Historic development patterns around the Lake have concentrated population centers on the north and south shores, privatizing much of the shoreline in these areas. Population density, number of overnight lodging facilities, and easy access for day users from nearby urban areas concentrates demand in these areas. Beach access often insufficiently accommodates demand. With growing populations inside and outside of the Tahoe Basin, demand for access shows no sign of waning.



Keeping the Lake shoreline open and accessible to the public is a top priority for the Recreation Program.

### Goal

To improve public access to lakefront recreational activities.

The focus of this program is to provide improved Lake access in a variety of forms to meet current and growing demand. In response to this demand, priorities will be placed on increasing acquisitions and retention of existing public access opportunities.

### Priority Projects

- Increasing land and beachfront acquisitions in Kings Beach and the City of South Lake Tahoe, where existing public facilities cannot meet demand
- Linking Lake access facilities with public transportation
- Increasing support services and facilities where appropriate for kayakers along the Lake Tahoe Water Trail’s shoreline.

### Accomplishments to Date

EIP partners have made significant strides in improving public access, particularly in the Tahoe Basin’s developed areas. In Tahoe City, the Tahoe City Public Utility District in partnership with the California Tahoe Conservancy and several EIP partner agencies, planned, constructed, and revitalized Commons Beach providing Lake access, a community gathering place, and a lakefront bike trail that serves as the hub of the town. The nearby Truckee River Outlet project also provided additional Lake access at Lake Tahoe’s outlet structure. Significant water quality benefits resulted from these projects as well.

### Unfunded Need for Improving Lake Access (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$2.75	\$31.9	n/a	\$3.3	\$.55	<b>\$38.5</b>

Currently the state of Nevada does not have a specific lake access program, however, access is often improved through the implementation of different recreation projects.



## DEVELOPING A COMPREHENSIVE TRAIL SYSTEM

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California and Nevada State Parks, Nevada Division of State Lands, Tahoe Rim Trail Association, US Forest Service

In recent decades, public agencies have made substantial public acquisitions of lands within the Basin to improve recreational opportunities. The completion of the Tahoe Rim Trail represents a cornerstone in the development of a Basin-wide trail system to connect the public to their lands and public lands to our communities. Access to these lands can be improved by developing an effective feeder trail system and supporting facilities. Many

existing trails were not designed for current use patterns and some are not adequately maintained.

### Goal

To improve air quality and reduce the impact of recreation on the environment.

The US Forest Service has prepared Road and Trail Access and Travel Management (Trail ATM) plans since 2002. The purpose of the Road and Trail ATM plans is to establish sustainable, adaptable trail systems that balance environmental concerns with the need for public access. Implementation of these plans will reduce use conflicts, improve recreation access on trails throughout National Forest System lands, reduce resource impacts, reduce long-term maintenance costs, and better meet public needs.

The focus of this program will be on the implementation of the ATM plans by providing facilities that will encourage multiple uses and improve recreation access on trails on public lands while reducing resource impacts.

### Priority Projects

- Trail improvements, including loops, connectors, and crossings; day use support facilities; scenic overlooks and



Connecting trails will enhance the outdoor experience at Tahoe.

vista points; and infrastructure facilities including restrooms, parking, transit, and directional signage

- Trail connections to areas outside the Basin
- Other projects consistent with US Forest Service Road and Trail Access and Travel Management Plans
- Bridges or other well-designed crossings over waterways or stream environment zones.

### Accomplishments to Date

Over the last decade, EIP partners have invested in improving the Basin-wide trail system through consolidation of trails, redesign of existing trails and facilities, including rerouting from sensitive areas, and development of new trails and facilities. The completion of the 155-mile Tahoe Rim Trail marks the most significant accomplishment to date. Other notable facilities include the completion of the 3.75-mile Marlette Lake Trail, Sand Harbor to Memorial Point Trail, Eagle Falls trailhead, Rainbow Trail retrofit, and improvements at Inspiration Point and Memorial Point.

### Unfunded Need for Developing a Comprehensive Trail System (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$13.76	\$5.58	\$3.44	n/a	\$6	\$28.8

Forest trails are located primarily on public lands.



## IMPROVING RECREATION FACILITIES

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California and Nevada State Parks, Heavenly Mountain Resort, Homewood Mountain Resort, Marinas, Local Government Jurisdictions and Utility Districts, US Forest Service

Current recreation facilities in the Basin are in high demand during peak seasons throughout the year. The Forest Service's 2005 National Visitor Use Monitoring analysis forecasts an increase of approximately 50,000 additional visitors each year, for the next 20 years. Some developed recreation sites, such as day use and overnight facilities near Emerald Bay and lakefront campgrounds, are commonly at capacity throughout much of the

summer season while overnight camping facilities are also in short supply at peak periods giving the visitor a low-quality experience.

### Goal

To improve the quality of recreation facilities and the recreation experience.

In order to address increasing and changing demands, the program will focus on long-range planning that must identify new opportunities to increase the availability of overnight recreation facilities.

### Priority Projects

- Replacing outdated recreation infrastructure and expanding overcrowded facilities while meeting accessibility requirements
- Increasing the supply of affordable overnight campground facilities
- Developing Burton Creek and Van Sickle State Parks to provide new day use opportunities.

### Accomplishments to Date

EIP partners have improved existing recreation facilities and acquired new public areas over the last decade to increase public accessibility and the quality of recreational experiences.



A crowded south shore beach during the height of summer illustrates the need for improved recreation facilities.

The North Shore has a network of places where the public can enjoy the Lake at high-quality day use facilities, including Commons Beach, Tahoe Vista, Carnelian Bay, Kings Beach, and the Truckee River Outlet. Campgrounds at Ed Z'berg-Sugar Pine Point and Emerald Bay State Parks, Meeks Bay Resort, and Zephyr Cove had water quality improvements and visitor enhancements constructed.

EIP projects improved the Lake Forest, El Dorado, and Tahoe Vista boat launches. Modifications to the Eagle Falls Trailhead and Pope Beach enhanced access to the day use facilities.

Other notable new facilities and retrofits include significant enhancements to the visitor experience at Vikingsholm and at the new Sand Harbor Visitor Center. Heavenly, Homewood, and Northstar ski resorts have all made substantial investments in improving their recreation facilities.

### Unfunded Need for Day/Overnight Recreation Facilities (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$16.5	\$29.72	\$9.9	\$5.5	\$30.8	\$92.42

Recreation facilities require substantial investments from all EIP funding partners.



## IMPROVING EDUCATIONAL PROGRAMS AND INTERPRETIVE FACILITIES

### PRIMARY IMPLEMENTING AGENCIES:

California Tahoe Conservancy, California and Nevada State Parks, Local Government Jurisdictions, Private Businesses, US Forest Service

The presence of large numbers of visitors and residents at Lake Tahoe offers outstanding opportunities to increase their understanding of Lake Tahoe's natural environment, how people affect these wild lands, and how forest management activities are employed. Sustaining healthy, productive ecosystems require that people remain socially connected to them and, to be connected, they must understand what it takes to sustain them. Advancing environmental literacy about Lake Tahoe's unique ecosystems is critical to the success of natural resource management and implementation of the EIP.

The focus of this program is to increase visitor information centers, promote environmental literacy and stewardship, improve public understanding of natural resource management and to improve the collaborative capacity for communities to engage in discussion to resolve natural resource issues.

### Goal

To improve visitor centers and implement interpretive and educational programs.

### Priority Projects

- Establishing major visitor information centers at key entry points into the Tahoe Basin to orient and inform visitors
- Developing a Basin-wide interpretive plan to identify interpretive needs for residents and visitors
- Creating a comprehensive, Basin-wide educational program for schools and other target audiences.



At top: US Forest Service staff members educate local school children. At bottom: 3rd graders at an educational field trip in the Angora burn area.

### Accomplishments to Date

EIP partners completed the construction and ongoing maintenance of the Meyers Interim Interagency Visitor Center, Sand Harbor Visitor Center and Explore Tahoe—An Urban Trailhead in the City of South Lake Tahoe.



Projects completed over the last decade include upgrades and installed interpretive signage facilities at Inspiration Point, Eagle Falls, Logan Shoals Vista, Stateline Lookout Overlook and Interpretive Trail, Tallac Historic Site, and the Taylor Creek Visitor Center, including the Stream Profile Chamber, Rainbow Trail, and Lake of the Sky Amphitheater.

### Unfunded Need for Education and Interpretive Programs (in millions)

Federal	State of CA	State of NV	Local	Private	Total
\$4.23	\$8.02	\$.14	\$.14	\$.84	\$13.37

All EIP funding partners incorporate educational programs into project planning to ensure the public is engaged.

# Scenic Quality

## IMPROVING SCENIC QUALITY PROGRAM

The Tahoe Basin’s stunning scenery attracts millions of visitors in spite of the fact that development has caused changes to the visual landscape in recent years.

Addressing the needs of residents and visitors can often result in competing demands that influence the scenic quality of the Basin. It is essential to understand and address the relationship between the natural and built environments in order to maintain the Lake Tahoe Basin’s scenic quality while being sensitive to economic and quality of life issues. The current built environment detracts from the Basin’s scenic quality and contributes to the non-attainment status of scenic thresholds. Scenic standards are matters of public policy at Lake Tahoe just as in many destinations throughout the world.

Preserving and enhancing the Region’s scenic values allows the Basin to continue to function as a major recreation and tourist attraction which is vital to the local and regional economies. This EIP program is intended to meet the broad goal of achieving scenic desired conditions and thresholds. To upgrade the scenic quality at Tahoe requires that buildings along the Lake shoreline and through scenic highway corridors be improved. Private property owners undertake most of these improvements which represents an important private contribution toward achieving the goals of the EIP. Projects completed by EIP partners in this program will leverage private-sector, opportunity-driven scenic improvements.

### Program Elements

- Improving the Scenic Quality of Roadways
- Improving the Scenic Quality of Shorelines

#### Primary Threshold Categories Improved by Program Objectives

 Water Quality	 Recreation
 Air Quality	 Fisheries and Wildlife
 Soil Conservation	 Noise
 Scenic Quality	 Vegetation

### Adapting to Climate Change

Climate change effects may result in an increase in unnatural disturbances such as large-scale wildfires, insect and disease attacks and new and spreading invasive species. A loss in scenic beauty may result over time as conditions worsen. Environmental restoration programs should include vegetation treatments that increase forest resiliency and protect valued scenic character attributes.



## IMPROVING THE SCENIC QUALITY OF ROADWAYS

### PRIMARY IMPLEMENTING AGENCIES:

CalTrans, NDOT, Private Property Owners, Sierra Pacific Power Company

The scenic quality along Tahoe’s highways is a critical element of the resident and visitor experience. TRPA adopted the Scenic Quality Improvement Plan in 1982 that sets target areas along the Basin’s major highways where improvements to scenic quality are needed, and identifies specific measures that can be taken to increase

the overall scenic quality. Along the many main highway corridors surrounding Lake Tahoe, scenic quality has declined because of urbanization and the dominance of buildings and structures.

### Goal

To improve the scenic quality along Lake Tahoe’s scenic roadways.

The focus of this program is to reduce the visual dominance of buildings and structures along roadways by using techniques such as moving overhead utility lines underground, implementing architectural design guidelines, and installing appropriate landscaping that reflects the natural attributes of the surrounding environment.

### Priority Projects

- Implementing projects that reduce the visual dominance of buildings and structures with context-sensitive designs and installing appropriate landscaping
- Moving overhead utility lines underground
- Applying design standards for highway structures such as improved lighting, guard rails, median treatments, revegetation of disturbed areas, and treatment of cut-and-fill slopes.

### Accomplishments to Date

The 1982 plan targeted 23 scenic roadway units for scenic restoration. As of 2006, 10 out of the 23 roadway units have reached threshold attainment and the rest have shown improvements.



Good design is essential to helping Tahoe Basin roadways blend in with the surroundings.

Scenic improvements include:

- Heavenly Village Redevelopment/Urban Improvements
- Ponderosa Ranch Landscaping
- Kings Beach Recreation Area Improvements
- Incline Village Urban Improvements
- Sierra Boat Company Mural and Façade Improvements
- Raley’s Center Redevelopment/Urban Improvements
- Round Hill Mall Redevelopment/McCall Realty Rebuild/ Chase Realty Remodel
- North Stateline Urban Improvements
- Tahoe City Urban and Marina Improvements
- Tahoe Meadows Multi-Use Path
- Carnelian Bay, Tahoe City, Highway 50 Utility Undergrounding Projects
- Industrial Ave. to Sawmill Rd. Utility Undergrounding

### Unfunded Need for Improving the Scenic Quality of Roadways (in millions)

Federal	State of CA	State of NV	Local	Private	Total
n/a	n/a	n/a	n/a	\$39	\$39

Funding responsibility for this program is primarily assumed by private entities. However, many of the roadway projects constructed by state, federal, and local partners include scenic improvements and are reported in other program areas.



## IMPROVING THE SCENIC QUALITY OF SHORELINES

### PRIMARY IMPLEMENTING AGENCIES:

California and Nevada State Parks, Private Lakefront Property Owners,  
Private Marinas, Public Land Management Agencies

Enjoying Lake Tahoe's beaches is a fundamental part of the recreation experience for residents and visitors. The Basin's recreation and scenic threshold standards are intended to enhance the public's access to these values.

The Tahoe visual landscape contains the unusual combination of rugged mountain peaks, the flat lake surface, and forested mountain slopes. This combination of landscape elements makes it one of the truly unique places in the world. Public and private development including piers, boathouses, buildings, and parking lots located in the shorezone can detract from scenic quality unless they are built according to specific design standards that make them less visible.

### Goal

To improve the scenic quality along the shoreline of Lake Tahoe.

The focus of the program will be to improve scenic quality ratings along the shoreline areas currently not in attainment with the environmental threshold carrying capacities.



### Priority Projects

- Reducing the visual dominance of piers, boathouses, and other structures located in the shorezone and along the shoreline
- Improving the scenic quality of public and private development projects along the shoreline, including buildings, parking lots, and other structures.

### Accomplishments to Date

Projects that have directly or indirectly improved scenic quality in the shoreline include:

- Tahoe City Marina Boathouse Remodel
- Commons Beach Redevelopment
- Tahoe Vista Recreation Area Redevelopment
- US Forest Service Restroom Architectural Upgrades
- Single Family Residential Rebuilds Consistent with Shoreland Ordinances
- Hyatt Floating Dock.



At left: Private property along the shoreline of Lake Tahoe. At right: A relaxing day at the beach in Lake Tahoe.

### Unfunded Need for Improving the Scenic Quality of Shorelines (in millions)

Federal	State of CA	State of NV	Local	Private	Total
n/a	n/a	n/a	n/a	\$7	\$7

Funding responsibility for this program is primarily assumed by private entities. Opportunities for federal, state and local partners to improve the scenic quality of the shoreline occur in other program areas.



## APPLIED SCIENCE PROGRAM

The Lake Tahoe Basin is a highly complex biophysical and social environment. The challenges posed by its restoration and continued management for multiple benefits are paralleled by few places in the world. Restoration and management of the Basin's ecosystem have required the sustained engagement of federal, state, and local governments, and the private sector. Yet determining how to proceed with conservation and restoration efforts in the face of limited information remains a central challenge.

A fully integrated and stable science program is essential to providing the information and knowledge to support sound stewardship of the Lake Tahoe Basin. The Science Program that supports the EIP is comprised of three interrelated elements: monitoring, applied research, and data management, synthesis, and reporting. Together, these programs are intended to meet the science needs of the EIP.

### ENVIRONMENTAL POLICIES DRIVE SCIENCE

Just as the EIP's purpose is to achieve environmental thresholds, science needs and priorities are driven by Compact threshold requirements and policy direction. The Lake Tahoe Restoration Act of 2000 also includes language about providing for a science program as part of the EIP:

*The Secretary [of Agriculture] shall provide for continuous scientific research on and monitoring of the implementation of projects on the [EIP] priority list, including the status of the achievement and maintenance of environmental threshold carrying capacities.*

This policy directive is supported by several policies and goals within the TRPA Regional Plan and the Federal Vision for the EIP (Lake Tahoe Basin Executives 2006).

## GOAL AND OBJECTIVES

The goal of the Science Program is to meet the information and knowledge needs of the EIP through the collaborative and integrated efforts of local, state, regional, and federal governments, the scientific community, and the public.

To meet this goal, the following objectives must be achieved:

- Provide a framework for the efficient use of resources to reduce management and policy uncertainties and address gaps in knowledge.
- Maximize coordination between agencies and the science community. Define roles and responsibilities. Establish communication linkages with decision makers.
- Continually work to maximize the credibility of the program and all science results by incorporating independence and the use of peer review.
- Recognize the diverse science needs of management and regulatory agencies and allocate science resources compatible with capital program priorities.
- Provide a significant source of summarized and synthesized Lake Tahoe-specific science results. The program needs to be useful to agencies, stakeholders, and the public and must help reduce uncertainty in decisions and actions and improve EIP capital program effectiveness.
- Ensure the program is adaptable and includes processes for amending or adding program elements to improve its performance as needed over time.
- Utilize best available science and technology to collect new data, conduct analyses, manage information, and make results available in a timely fashion.
- Obtain long-term, stable funding at a level commensurate with carrying out necessary science activities including monitoring, research, information management, and reporting program elements.

## PROGRAM ELEMENTS

To support the information and knowledge needs of land and resource managers and regulatory agencies, scientific activities are best organized and implemented through an integrated science program. This Science Program is comprised of three interrelated program elements: 1) monitoring, 2) applied research, and 3) data management, synthesis and reporting. These elements work together within a continual improvement and adaptive management cycle to meet the goal and objectives identified above.

# Monitoring

## MONITORING PROGRAM

Monitoring is the primary means of assessing the extent to which the Region is meeting environmental goals, or whether a project, program, or policy is performing as expected. Monitoring results are also an important source of scientific information used to inform the management and restoration of complex systems. The results of monitoring provide an information source for quantifying and reporting progress to decision-makers and the public, focusing research, adjusting land use policies and prioritizing future restoration actions.

### Monitoring Program Elements

**Implementation Monitoring** is the monitoring of management actions in relation to planned activities. This form of monitoring catalogues the completion of projects or activities as designed. It also documents compliance with environmental regulations and mitigation obligations in project implementation. Implementation monitoring provides the most basic information related to EIP project implementation (e.g., the EIP number, location, and type, implementation entity, and costs).

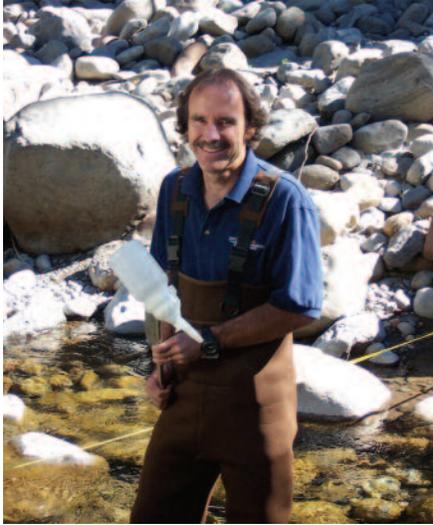
**Effectiveness Monitoring** is the monitoring used to determine the effectiveness of management practices and actions in achieving desired outcomes. This type of monitoring should be an integral part of capital improvement, regulatory, and incentive programs, so that the outcomes of individual or combined effects of actions taken under various programs are known. Effectiveness monitoring does not address the uncertainties that are associated with techniques or designs, nor does it attempt to compare the relative effectiveness of different techniques or designs—these questions reside in the



Mt Tallac towers majestically above Lake Tahoe.



UC Davis research vessel.

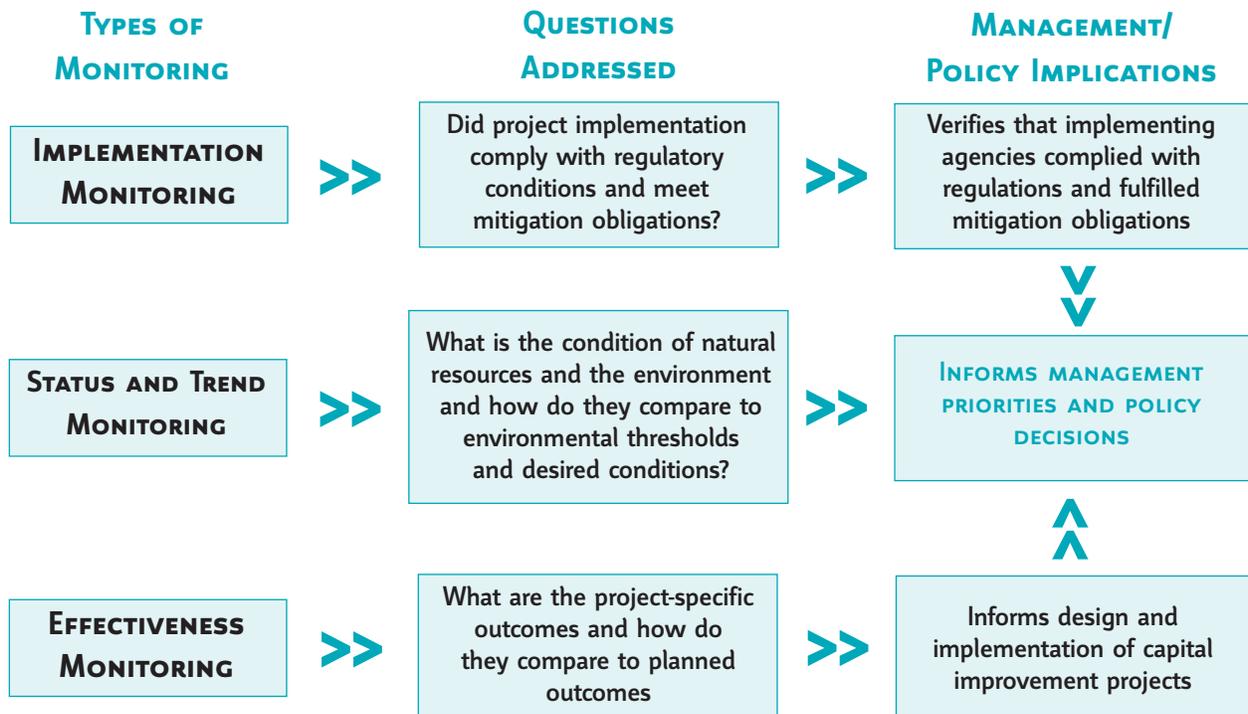


UC Davis researcher.

realm of applied research. Integration of effectiveness monitoring and research to address priority uncertainties is the efficient approach to maximizing information gains.

**Status and Trend Monitoring** is the monitoring used to determine the status and trends of resources, habitats, and their agents of change. This is the principal type of data gathering that informs management about overall environmental and resource conditions relative to established environmental objectives and thresholds. Typically, this type of monitoring serves to track the status and trends of indicators selected to represent a set of conditions pertinent to environmental objectives.

Each of these types of monitoring is necessary to provide relevant information for better management and restoration of habitats and resources in the Lake Tahoe Basin. The various types of monitoring can be applied at different spatial scales depending on the type of information desired. Generally, implementation monitoring is applied at the project scale, whereas effectiveness monitoring may be applied at a variety of scales (e.g., project, watershed, or region) depending on the questions of interest. Status and trends monitoring is often focused at the region or sub-regional level to provide information about overall environmental and resource conditions.



This diagram shows the relationships among various types of monitoring and the ways in which those types of monitoring can inform managers and policy makers. The questions also indicate how various types of monitoring need to provide information at the project, program, or in the case of environmental thresholds, Basin-wide scales.

Applied research is one of the main ways science can help to reduce the uncertainties that confront resource management and regulatory agencies. Research tests the strength of relationships to help determine which processes are most important in a system and how changes can best be monitored. Applied research focuses on developing research results of direct application to management information needs. In an applied science program, research and monitoring should be highly coordinated to ensure that the most pertinent information is being gathered to answer the important questions.

Research aims to produce an ever-greater body of knowledge through a structured process of inquiry that seeks to discover, interpret, and revise our knowledge of facts. Research may include laboratory or field experiments, or the development of models.

Research and monitoring operate most effectively together. Monitoring, particularly status and trends monitoring, generates the knowledge necessary to pose new hypotheses about key cause-effect relationships, and the role of underlying processes in shaping ecosystems. Research is the means by which new hypotheses are tested and helps explain the environmental conditions that are observed.

### Contemporary Lake Tahoe Food Web

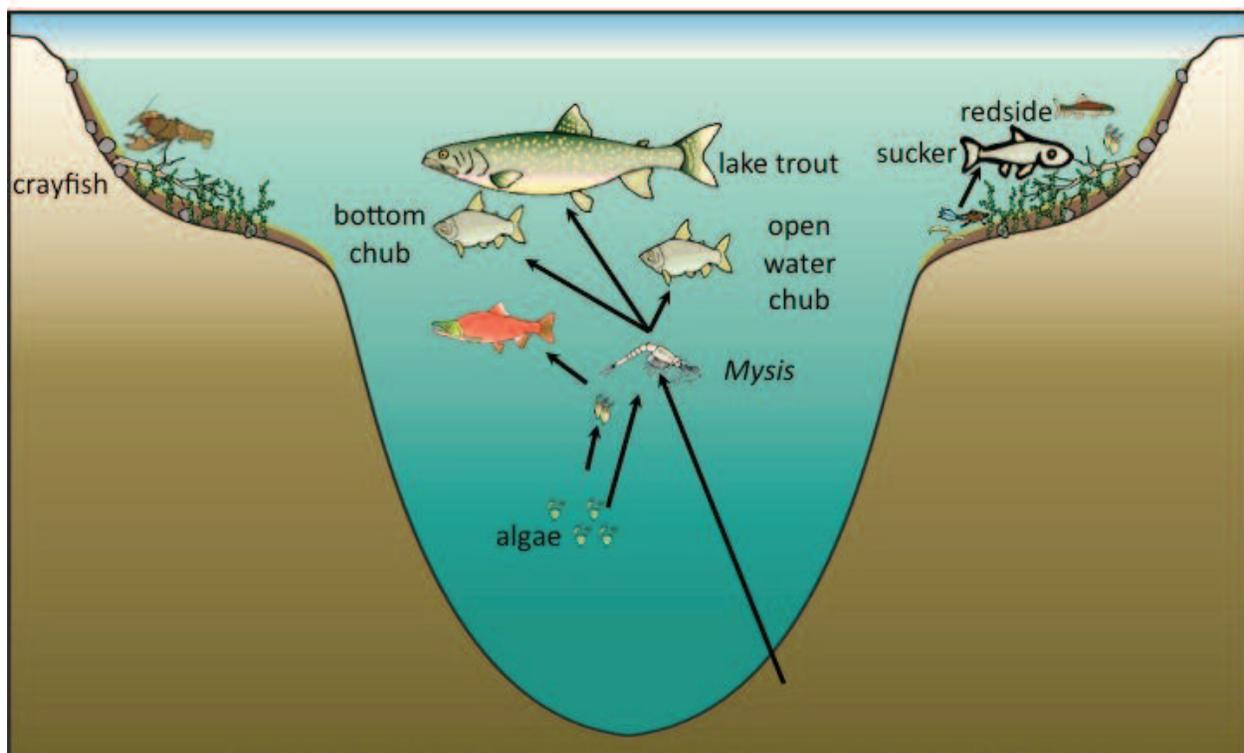


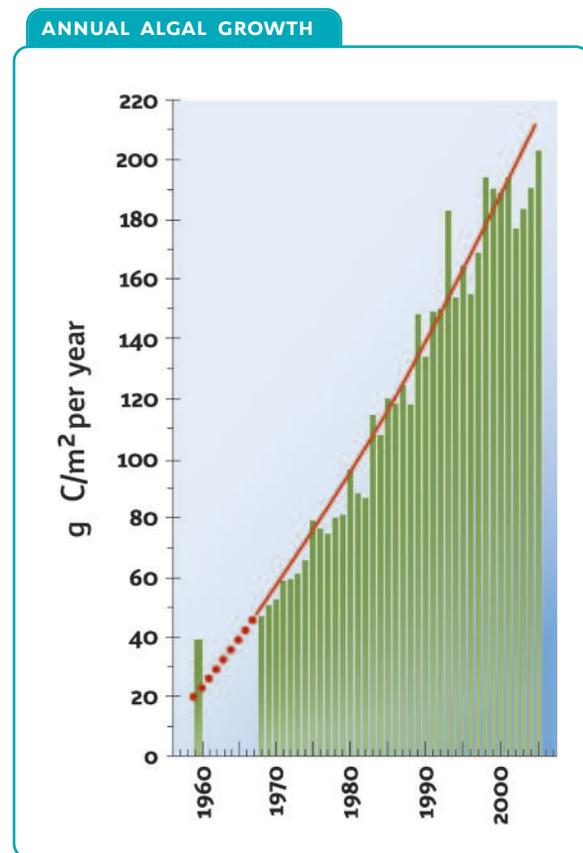
Figure based on data from Beauchamp 1994, Chandra 2003, Vander Zanden et al. 2003, Chandra in review.

## Applied Research Program Elements

**Review and Synthesis** – The focus of this research element is to document the state-of-knowledge about a specific topic by compiling and synthesizing existing data and/or studies conducted within or outside the Basin. For example, the US Forest Service – Rocky Mountain Research Station published the “Rainbow Series” to provide managers at a national scale with a single source of information on wildland fire effects on various ecosystem components. This type of applied research does not typically require field or laboratory investigations.

**Conventional Investigations** – This research element aims to test hypotheses about ecosystem relationships, management treatment strategies or policy effects in order to reduce uncertainties about a topic or to advance our understanding of a topic in which there is incomplete understanding. This type of applied research uses the scientific method and typically includes field or laboratory observation or experimentation.

**Directed Studies** – This research element aims to fulfill a specific agency or manager’s information need to support a management decision or action. These studies can include both review and synthesis and conventional investigations. Examples of directed studies include but are not limited to developing or improving predictive models, or research to support the development of monitoring and evaluation protocols and plans.



**Why is algal growth important?**  
Algae reduces the Lake’s transparency and degrades water quality.

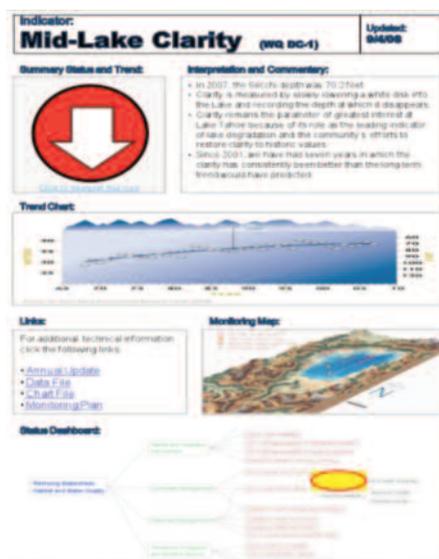
# Data, Analysis and Reporting

## DATA MANAGEMENT, ANALYSIS AND REPORTING PROGRAM

Knowledge and information gained through monitoring and research needs to be shared with decision makers and the public so that it can be put to use in determining the impacts of actions taken and in decisions that affect future actions. Data management systems are needed to store, document, manage, and share information with diverse audiences. Synthesis serves to interpret information gathered from different sources and disciplines, so that robust answers can be generated for particular problems. Timely and efficient reporting ensures the latest and most relevant information is available to all parties. Improvements in data management, synthesis and reporting include: 1) utilizing web-based systems to store and analyze data, 2) developing and adopting standard operating procedures for data management that provide for seamless data analysis and synthesis, and 3) disseminating monitoring and research results in ways that are understandable to a broad range of people. From a management standpoint, data summary and synthesis combined with reporting comprise the most important element of an integrated science program, because it is these activities that provide research and monitoring results in forms that managers can apply directly to management actions, decisions, and policy choices.

### Data Management, Analysis and Reporting Systems Program Elements

**Data and Information Management** – The efficiency of report generation hinges on a well-developed data management infrastructure and standard operating procedures for their treatment. The objective of this program element is to promote the management of data and information in



ways that ensure their quality and accessibility to interested users. The Tahoe Integrated Information Management System (TIIMS) is a web-based platform that currently exists and could be used to support this need with additional investment into its functionality and operation.

**Data Summary and Synthesis** – This priority would provide the infrastructure, procedures, and capacity to complete summary and synthesis efforts designed to convert data into information. To meet the growing data and information needs of resource management agencies and the public, it is important that data are translated into information and information is converted to knowledge as efficiently as possible in order to maximize its potential benefits.



Sound science will continue to drive public policy at Lake Tahoe.

**Reporting** – Two reports will be regularly produced to communicate the results of monitoring and research efforts:

- **Annual Briefing Report** - Completed annually, this report will summarize the results and information gained from monitoring and research efforts. The report will provide a snapshot of project effectiveness and the status and trends of various indicators.
- **State of the Tahoe Basin Report** - Completed every fifth year, the State of the Tahoe Basin Report is envisioned to include a more comprehensive synthesis of monitoring and research results generated over the previous four to five years. Information and results provided in this report will focus on combining and synthesizing the results of applied research, implementation, effectiveness, and status and trend monitoring with capital program activities and outputs. The report would be intended to meet agency reporting mandates and needs. For example, the TRPA is mandated to produce a report on environmental conditions relative to environmental thresholds every five years. The information in this report will be useful in the evaluation and potential modification of management strategies and implementation programs. This report will also alert high-level officials to emerging issues that may require new or alternative policies. This information also would serve to stimulate discussions about capital program priorities.

Funding Targets for Science* (in millions):						
Science Activity	Federal	California	Nevada	Local	Private	10-yr. Funding Target
Effectiveness Monitoring	Up to 2% of annual capital funding may be invested					\$27 +/- 11
Status and Trends Monitoring	\$6	\$18.7	\$9.3	-	-	\$34
Applied Research	\$20	\$2.6	\$2.4	-	-	\$25
Data Mgmt, Synthesis, Reporting	\$1.5	\$2	\$0.9	\$0.6	-	\$5
	\$27.5	\$23.3	\$12.6	\$0.6	-	\$91

\* More details on the Science Program funding strategy are provided in Appendix 4.

# Science Program Management

## THE SCIENCE PROGRAM MANAGEMENT SYSTEM

The Science Program is intended to continue the important scientific investments in the Tahoe Basin and to take monitoring, research, and reporting to the next level. There currently is no functioning management system to organize all existing resources and activities and to create new procedures as necessary to fully integrate science efforts and results with resource management and restoration. In particular, there is a need for the science and management/regulatory communities to collaboratively:

- Identify and prioritize research, synthesis, and other science information needs of management and regulatory agencies,
- Establish processes to track and synthesize science efforts, and
- Convert the analyses and results into knowledge that can then be used to inform decision making.

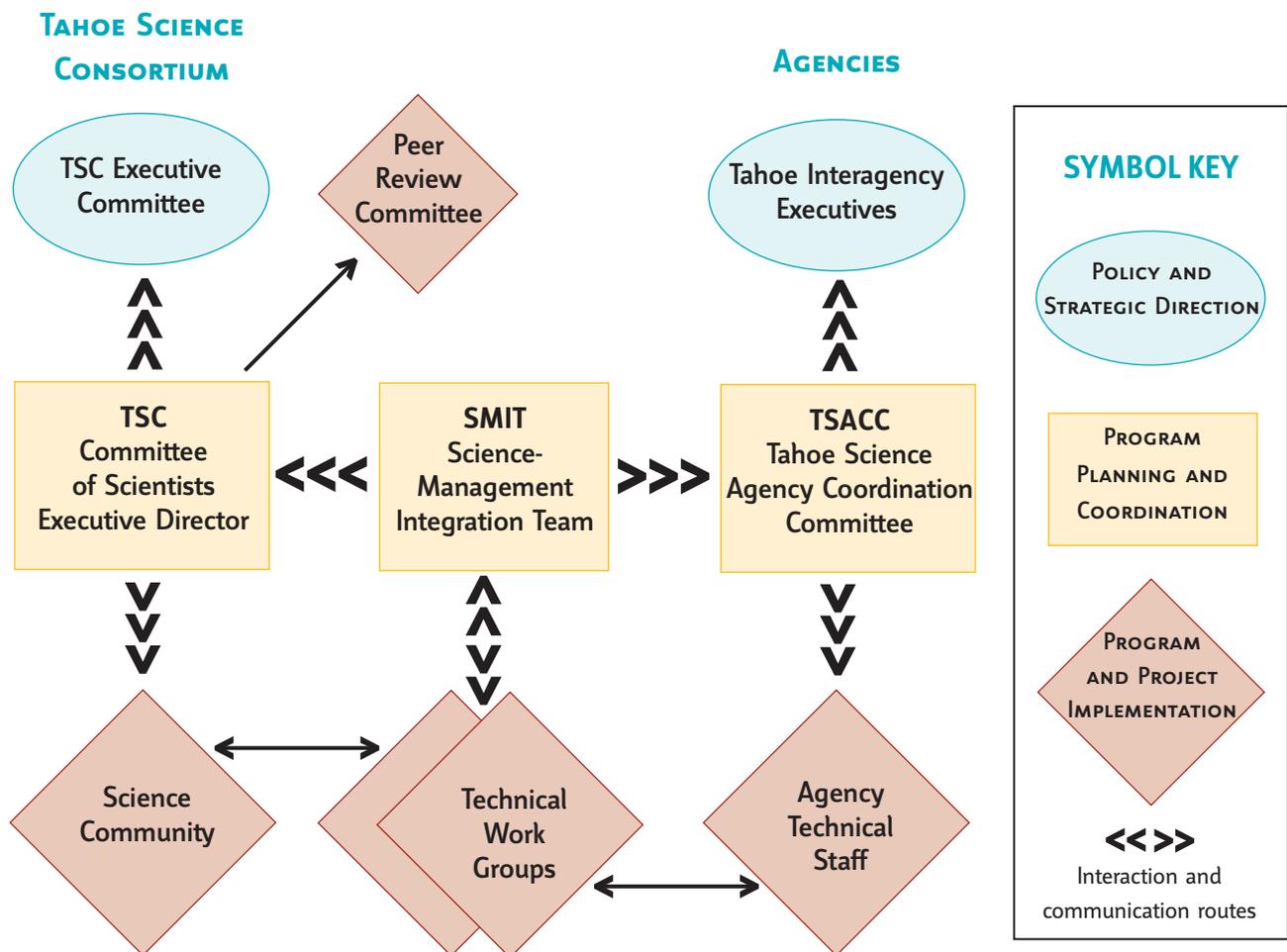
Within the context of the Environmental Improvement Program, there is a need for the Science Program to provide information essential to improving the effectiveness of the capital program investments. Information generated from science activities may also influence management strategies and policy decisions beyond the EIP. Implementation of a Science Program Management System (SPMS) is essential to provide structure for obtaining the information necessary to improve and optimize the rate and degree to which environmental thresholds are achieved. This SPMS also can provide an objective process for adjusting thresholds.

The EIP SPMS is based on the Generalized Management System Design Manual (Sokulsky and Beierle, 2007) for application to major Tahoe Basin programs and follows the Plan >> Do >> Check >> Act cycle.



University of Nevada Reno researcher.





**Organizational structure to support ongoing integration of science activities and management issues in the Lake Tahoe Basin (from Hymanson 2008). This diagram identifies the entities involved and the routes of interaction and communication among the entities.**

It will take considerable effort among all EIP participants to conduct the full range of management system activities. Roll-out of the management system will require strategic thinking about the most important components of the system and the degree of effort each step should involve, commensurate with available resources. This will be a factor in each year’s round of management decisions concerning the following year’s EIP restoration activities.

Although several components of this system are undertaken currently, they are neither fully coordinated nor are they integrated systematically into management and policy decision-making. By providing a structure to guide and supplement existing efforts, it is intended that iteratively, over time, we will achieve a fully integrated science program. The SPMS will: 1) ensure funding of science endeavors commensurate with the need and priority, 2) clarify roles among the scientific and governmental communities, 3) inform subsequent actions via fully vetted recommendations, and 4) ensure that the program continually improves over time. A more complete description of the SPMS is provided in Appendix 4.

# *Accomplishments and Priorities*

## WATERSHEDS, HABITAT, & WATER QUALITY

### SCIENCE ACCOMPLISHMENTS

- Researchers discovered in recent years that inorganic fine sediment has caused most of the decline in Lake Tahoe clarity versus water quality degradation from the nutrients nitrogen and phosphorus. These findings led to development of a Lake clarity model and a pollutant loading model to inform the Lake Tahoe TMDL.
- Monitoring of sediment loads and stream flows by the Lake Tahoe Interagency Monitoring Program provides key data needed for the clarity and pollutant loading models.
- Data synthesis efforts, such as the annual State of the Lake report, continue to pull together research findings and monitoring data to inform the public of the status and trends in environmental conditions Basin-wide.
- Comprehensive science studies of natural resources completed to date include several assessments of Basin watersheds and Basin-wide inventories of plant and animal species and their habitats.

With \$10 million invested in water quality research to inform the development of the Lake Tahoe TMDL, the EIP is using cutting-edge science to prioritize projects to achieve watershed restoration and Lake clarity goals. Despite this body of knowledge, gaps and uncertainties still exist.

### SCIENCE PRIORITIES

- Developing a better understanding of how watershed restoration projects reduce sediment loadings and improve Lake clarity.

Science will serve as one of the fundamental underpinnings of the EIP update going forward. Building on the \$50 million invested in scientific research to date, the program has established near-term priorities for research and monitoring to help inform decision-making in the Tahoe Basin. The following pages highlight scientific accomplishments and priorities for the future.

- Developing an inventory, classification, and performance tracking system to support agency programs to restore and protect stream environment zones in the Tahoe Basin.
- Assessing the effectiveness of stormwater management projects in treating and reducing polluted runoff in urban areas as well as understanding their effects on riparian habitat condition and species of concern.
- Developing a Regional Stormwater Monitoring Program (RSWMP) to collect, coordinate and disseminate data aimed at assessing the

effectiveness of capital stormwater management and erosion control investments designed to achieve Lake Tahoe clarity goals.

- Documenting and predicting effects of climate change on Lake Tahoe Basin resources and management activities.

### **Threatened, Endangered, and Sensitive Species**

Recovery and conservation plans for Lahontan Cutthroat Trout and Tahoe Yellow Cress have included science efforts to guide and assess these programs, while ongoing monitoring has provided basic information on the status and trends of key wildlife species (e.g., northern goshawk). However, EIP partners need critical assessments to ensure we set realistic targets given large-scale shifts related to climate change and forest-management efforts. The top science priorities for threatened, endangered and sensitive species include:

- Developing science-based performance measures and adaptive management approaches for at-risk species conservation and recovery programs.
- Improving our understanding of sensitive species' responses to forest management and conservation actions.
- Completing a comprehensive evaluation of conservation measures and restoration efforts for special communities and threatened, endangered, and sensitive species. These evaluations should include an assessment of potential outcomes given habitat modification due to climate change and Basin-wide forest-management efforts.
- Developing a Basin-wide long-term status and trends monitoring program for species of concern and special communities (e.g., fens, wetlands, and aspen communities).

### **Managing Invasive Species**

Numerous invasive species (both terrestrial and aquatic) now have established populations in the Lake Tahoe Basin, and the threat of additional introductions persists. The effects of aquatic invasive species are most pronounced in the nearshore habitats of Lake Tahoe, while recently disturbed forest and urban areas are most susceptible to the invasion of terrestrial species. The top science priorities for managing invasive species include:

- Using carefully designed pilot projects, complete science-based evaluations of the effectiveness of alternative strategies to control and manage invasive and noxious species that are now established in the Tahoe Basin.
- Developing and maintaining a Basin-wide monitoring program of both aquatic and terrestrial habitats to assess the distribution and abundance of invasive species now established in the Tahoe Basin. This monitoring program should also serve as one component of an early warning system to detect new invasions.
- Examining the factors affecting nearshore water quality and ecology.
- Conducting focused studies to develop invasive species threshold carrying capacities for terrestrial and aquatic habitats.

# *Accomplishments and Priorities*

## FOREST MANAGEMENT

### SCIENCE ACCOMPLISHMENTS

Restoring forest structure and composition, particularly within and surrounding urbanized areas, is a major priority for land management agencies and other EIP partners.

- Research findings have shown that overly dense forest stands are more susceptible to drought stress, disease and insect attacks, and that fuels reduction measures substantially decrease the rate of spread and the intensity of wildfires, such as the Angora Fire of June 2007.
- Monitoring of fire behavior and impacts during and after the Angora Fire clearly shows the benefits of fuels reduction treatments. Monitoring of the implementation of vegetation treatments and fuels reduction projects annually shows between 85 and 100 percent effectiveness of the BMPs installed to prevent erosion during and following project operations.

### SCIENCE PRIORITIES

- Evaluating the effectiveness of forest fuel management projects in reducing the threat of catastrophic wildfire in the wildland-urban interface.
- Developing a Basin-wide forest monitoring program that operates in concert with fuels reduction projects to quantitatively assess at various spatial scales the effects of fuels reduction projects on the spectrum of ecosystem management objectives.
- Conducting focused studies to better understand changes in habitat loss, habitat alteration, or habitat use in urban forests.
- Monitoring soil, water, habitat and species responses to vegetation treatments and fuel reductions.
- Continuing to study the economic viability of various biomass removals and utilization strategies.
- Conducting focused studies to evaluate alternative strategies to minimize the impacts of fuels management projects in stream environment zones.
- Undertaking focused studies to determine the appropriate management strategies that maximize defensible space, but at the same time function to minimize erosion on private parcels.
- Documenting and predicting the effects of climate change on forest health.

# *Accomplishments and Priorities*

## AIR QUALITY AND TRANSPORTATION

### SCIENCE ACCOMPLISHMENTS

EIP partners have identified an urgent need for improved air quality monitoring infrastructure and evaluation tools to measure and mitigate the impacts of air pollutant levels on human health, forest health, and Lake clarity.

- Research has shown atmospheric pollution degrades Lake Tahoe clarity with particulate matter and nitrogen and phosphorus compounds.
- Monitoring has shown that urban air quality is distinct from air quality in undeveloped areas of the Basin. This supports the conclusion that local pollution sources (including fires, woodstoves, roadway dust, stationary emissions, and vehicle exhaust) produce most of the atmospheric pollution in the Tahoe Basin.

### SCIENCE PRIORITIES

- Developing a comprehensive, Basin-wide air quality monitoring program to better assess the long-term status and trends of air pollutants under a range of meteorological conditions.
- Developing a greenhouse gas emissions inventory to measure and evaluate the effectiveness of transit programs, forest management activities, and other strategies to reduce emissions and meet new federal and state regulations.
- Conducting focused studies to quantify the sources and pathways of airborne pollutants (especially particle deposition) to Lake Tahoe.
- Developing an air quality model that utilizes the full suite of meteorological, chemical, and particulate data.
- Conducting a synthesis analysis to document and predict the effects of atmospheric pollution and climate change on Lake Tahoe Basin resources and management activities.
- Increasing the Tahoe Basin's capacity to monitor the status and trends of transportation characteristics in order to improve transportation management strategies.

# *Accomplishments and Priorities*

## RECREATION AND SCENIC RESOURCES

### SCIENCE ACCOMPLISHMENTS

- The Forest Service published its National Visitor Use Monitoring results for the Lake Tahoe Basin in 2002 and conducted a follow-up survey in 2006. Other Basin-wide surveys conducted by TRPA and project-level research using more specific surveys related to project sites or narrower user categories. These surveys give recreation managers insights into visitor satisfaction with developed and dispersed recreation opportunities, both day use and overnight.
- Monitoring of visitor use occurs by a number of means beyond special studies, including the Forest Protection Officer work conducted by the Forest Service (e.g., monitoring snowmobile and OHV use).
- US Forest Service research related to scenic integrity and unique landscape character types.

### SCIENCE PRIORITIES

- Evaluating which communication approaches are most effective at informing a multitude of Tahoe Basin user groups to influence recreation user behaviors in support of resource and recreation goals.
- Developing a consistent, Basin-wide recreational survey that tracks seasonal changes, user satisfaction, and long-term changes in recreation trends and demand.
- Developing statistical analysis of the factors associated with recreational quality to help direct future infrastructure investment.
- Evaluating infrastructure capacity and recreational needs for Basin-wide and site-specific areas.
- Monitoring the use patterns for existing recreation sites and activities to help inform priorities for future facilities.
- Developing objective scenic quality indicators to identify and preserve unique landscape character types.
- Monitoring effectiveness of educational and interpretive programs in encouraging voluntary participation in resource protection/conservation.



## PROGRAM SUPPORT

MAKING THE EIP WORK REQUIRES THE COLLABORATION of approximately 50 partner organizations and the public. To further support the development and ongoing implementation of the EIP, partner agencies are developing public outreach, technical assistance, and reporting programs. The Program Support Focus Area captures all of these critical components as well as the operations and maintenance needs for capital facilities.

Support programs are essential to ensure that EIP capital projects are cost effective and provide lasting benefits, are broadly supported by the public and key stakeholders, and are highly visible to the public, funding entities, and decision-makers.



### PUBLIC OUTREACH

Because many elements of the EIP depend upon the actions of local residents and visitors, the EIP public outreach program will educate homeowners and businesses on actions they can take to protect the Lake and help meet other goals of the EIP. These include:

- Educating homeowners and businesses on water quality best management practices and defensible space to protect natural resources from erosion and the threat of catastrophic wildfire



Project signage helps educate the public about where funds are being invested to protect Lake Tahoe.

- Informing boat owners about how to prevent the introduction and spread of invasive species
- Educating both residents and visitors on other actions they can take to better protect the Lake and the ecological health of the Basin.

Linking these efforts is the Environmental Improvement Program’s visual identity. The EIP logo provides a cohesive foundation for newsletters, collateral materials, and project signage which brings more than 50 partner agencies together under one umbrella. This visual identity will help build public support and understanding of the collaborative effort to conserve Lake Tahoe.

## TECHNICAL ASSISTANCE

Several EIP partners, including the Natural Resources Conservation Service and the Resource Conservation Districts, provide technical assistance to property owners, businesses, and local agencies in developing and implementing EIP projects. These programs provide highly-skilled staff support and education to the general public on defensible space, water quality best management practices, and invasive species projects.

<b>Program Support (Technical Assistance, Program Administration, Public Education) Funding Target:</b>	
<b>Program Support</b>	<b>\$44 million</b>
<b>Operations and Maintenance</b>	<b>\$142 million</b>

## MAINTAINING CAPITAL FACILITIES THROUGH OPERATIONS AND MAINTENANCE

The continued effectiveness and longevity of EIP projects are highly dependent upon ongoing operation and maintenance (O & M) programs. Without these programs, the Basin's large infrastructure of water quality, forestry, and recreational facilities would not be adequately maintained to serve the public or meet the goals of the EIP.

In general, public agencies are responsible for O&M costs on their own lands, local governments are responsible for maintaining facilities funded by state and federal agencies, and property owners are responsible for maintaining water quality and defensible space best management practices on their properties.

Activities supported in this area include any increased operation and maintenance responsibilities created as a direct result of implementation of a capital improvement related to an EIP program. The unfunded need for O & M over the next 10 years is approximately \$142 million. These costs are primarily associated with transportation system needs, stormwater management, and forest ecosystem health and hazardous fuels reduction activities.



Top left: US Senator Harry Reid of NV, US Senator Dianne Feinstein of CA at the 12th Annual Lake Tahoe Summit.

Top right: Visitor centers, such as the one pictured here at the Lake Tahoe-Nevada State Park at Sand Harbor, are an important venue for public outreach. Bottom: A spectacular Lake Tahoe sunset.

## EIP MANAGEMENT AND REPORTING

The EIP will be guided and managed by the Tahoe Interagency Executive (TIE) Committee, its Steering Committee, and a subcommittee of the TIE called the Strategic Planning Group. These groups consist of executives and staff of federal, state, regional, and local agencies responsible for carrying out and permitting EIP projects and programs.

To effectively manage and implement the EIP, these groups will focus on:

- Developing annual lists of accomplishments and priority projects
- Developing a comprehensive set of performance measures to evaluate progress toward meeting EIP goals
- Coordinating the implementation of collaborative interagency projects in key watersheds
- Working with the Tahoe Science Consortium to address the Basin's highest priority monitoring, applied research, and data management needs
- Conducting public and stakeholder outreach on EIP projects and programs.

These interagency groups will also work with the Tahoe Science Consortium and key stakeholders in developing a series of EIP reports, including:

**EIP Annual Report** – This report will include:

- A summary of EIP projects and accomplishments in the previous year
- An updated list of EIP projects planned for the year ahead
- An evaluation of progress in meeting performance standards for all elements of the program.

**Annual Science Report:** This report will summarize the results and information gained from monitoring and research efforts. The report will provide a snapshot of project effectiveness and the status and trends of various indicators.

**State of the Tahoe Basin Report:** Completed every fifth year, the State of the Tahoe Basin Report is envisioned to include a more comprehensive synthesis of monitoring and research results generated over the previous four to five years. Information and results provided in this report will focus on combining and synthesizing the results of applied research, implementation, effectiveness, and status and trend monitoring with capital program activities and outputs.

The report will be used to:

- Meet agency reporting mandates and needs
- Evaluate and potentially modify management strategies
- Alert the agencies and the public to emerging issues.



# Partnerships

**PARTNERSHIPS MAKE EIP POSSIBLE**

## Regional Agencies

- Tahoe Regional Planning Agency (TRPA)
- Tahoe Transportation District (TTD)

## States of California & Nevada

- California Air Resources Board (CARB)
- California Department of Resources
- California Department of Forestry (CDF)
- California Environmental Protection Agency
- California State Lands Commission
- California State Parks (CA State Parks)
- California Tahoe Conservancy (CTC)
- California Water Quality Control Board–Lahontan Region (Lahontan Water Board)
- California Department of Transportation (CALTRANS)
- Nevada Department of Transportation (NDOT)
- Nevada Department of Wildlife (NDOW)
- Nevada Division of Environmental Protection (NDEP)
- Nevada Division of Forestry (NDF)
- Nevada Division of State Lands (NDSL)
- Nevada-Tahoe Resource Team (NTRT)
- Nevada Public Service Commission
- Nevada State Parks (N-PARKS)

## Local Governments/Organizations

- Carson City
- Carson City Fire Department
- City of South Lake Tahoe (& Redevelopment Agency) (CSLT)
- City of South Lake Tahoe Fire Department
- Desert Research Institute (DRI)
- Douglas County (DOCO)
- Douglas County Sewer Improvement District
- El Dorado County (ELDO)
- Fallen Leaf Lake Fire District
- Incline Village General Improvement District (IVGID)
- Kingsbury General Improvement District (KGID)
- Lake Valley Fire Protection District
- Lakeridge General Improvement District (LGID)
- Meeks Bay Fire Protection District
- Nevada Tahoe Conservation District (NTCD)
- North Lake Tahoe Fire Protection District
- North Tahoe Fire Protection District
- North Tahoe Public Utility District (NTPUD)
- Placer County (PLCO)
- Roundhill General Improvement District (RGID)
- Sierra Fire Protection District
- South Tahoe Public Utility District (STPUD)
- Tahoe City Public Utility District (TCPUD)
- Tahoe-Douglas Fire Protection District

## Tahoe Resource Conservation District (TRCD)

- U.C. Davis/Tahoe Environmental Research Center (TERC)
- University of Nevada, Reno (UNR)
- Washoe County (WACO)
- Washoe Tribe

## Federal Agencies

- Army Corps of Engineers (USACE)
- Bureau of Land Management (BLM)
- Bureau of Reclamation (Reclamation)
- Federal Highway Administration (USFHA)
- Federal Transit Administration
- Natural Resources Conservation Service (NRCS)
- U.S. Environmental Protection Agency (EPA)
- U.S. Forest Service (US Forest Service)
- U.S. Geological Survey (USGS)
- U.S. Fish & Wildlife Service (USFWS)

## Private Entities

- Heavenly Mountain Resort
- Lake Tahoe Gaming Alliance
- Lake Tahoe Transportation & Water Quality Coalition
- League To Save Lake Tahoe
- North Lake Tahoe Resort Association
- Private Sector/Local Businesses
- Sierra Pacific Power Company



**SOURCES FOR REPORT'S CONTENT INCLUDE THE FOLLOWING:**

- Tahoe Regional Planning Agency and EIP Partners
- UC Davis, Tahoe Environmental Research Center
- "From Timber Barons to Ecologists, Tahoe" Douglas H. Strong
- California Tahoe Conservancy 20th Anniversary Report
- Explore Tahoe, an Urban Trailhead and environmental education center
- The Lake Tahoe Transportation and Water Quality Coalition
- Tahoe Rim Trail
- BMP Ecosciences
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# Appendix I

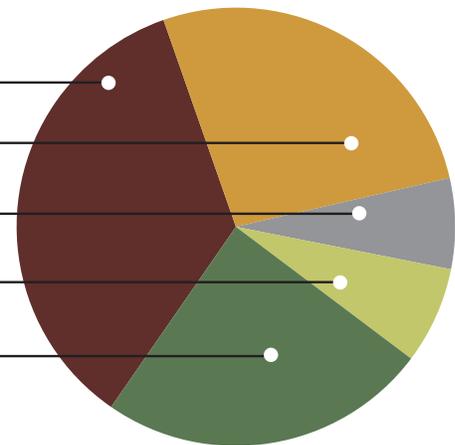
## EIP FUNDING TARGETS BY SHARE

EIP Capital Programs	Shares of EIP Capital Funds Needed (in millions)					
	Federal	California	Nevada	Local	Private	Total
<b>Watersheds, Habitat, &amp; Water Quality</b>	333	223	82	64	211	913
Stormwater Management Program	186	127	68	63	205	649
Watershed Management Program	115	86	12	-	-	213
Threatened, Endangered, & Sensitive Species Program	24	6	1	-	-	31
Managing Invasive Species Program	8	4	1	1	6	20
<b>Forest Management</b>	89	33	5	17	59	203
Forest Ecosystem Health & Reducing Hazardous Fuels Program	89	33	5	17	59	203
<b>Air Quality &amp; Transportation</b>	64	83	-	17	10	174
Air Quality & Transportation Program	64	83	-	17	10	174
<b>Recreation &amp; Scenic Resources</b>	37	76	13	9	84	219
Recreation Program	37	76	13	9	38	173
Scenic Program	-	-	-	-	46	46
<b>Capital Program Total</b>	<b>523</b>	<b>415</b>	<b>100</b>	<b>107</b>	<b>364</b>	<b>1,509</b>
<b>Other EIP Program Elements</b>	<b>Federal</b>	<b>California</b>	<b>Nevada</b>	<b>Local</b>	<b>Private</b>	<b>Total</b>
Applied Science	\$46	\$27	\$11	\$7	\$0	\$91
Program Support (Technical Assistance, Program Administration)	-	-	-	-	-	\$44
Operations and Maintenance	-	-	-	-	-	\$142
<b>Non-Capital Total</b>						<b>\$277</b>
<b>GRAND TOTAL</b>						<b>\$1.8 billion</b>

### EIP CAPITAL UNFUNDED NEEDS BY SECTOR OVER THE NEXT 10 YEARS

- Federal \$523 Million (35%)
- California \$415 Million (27%)
- Nevada \$100 Million (7%)
- Local \$107 Million (7%)
- Private \$364 Million (24%)

Total **Capital** Funding Need: \$1.5 Billion



# Appendix 2

ENVIRONMENTAL THRESHOLD COMPLIANCE INDICATORS TRENDS		
Threshold	Positive Trend  Negative Trend  No Trend 	Trend
<b>I. AIR QUALITY</b>		
AQ-1	CO	
AQ-2	O <sub>3</sub>	
AQ-3	Particulate	
AQ-4	Visibility	
AQ-5	U.S. 50 Traffic Volume	
AQ-6	Wood Smoke	
AQ-7	VMT	
AQ-8	Atmospheric Nutrient Loading	
<b>II. WATER QUALITY</b>		
WQ-1	Turbidity (Shallow)	
WQ-2	Clarity, Winter	
WQ-3	Phytoplankton PPr	
WQ-4	Tributary Water Quality	
WQ-5	Runoff Water Quality	
WQ-6	Groundwater	
WQ-7	Other Lakes	
<b>III. SOIL CONSERVATION</b>		
SC-1	Impervious Coverage	
SC-2	Naturally-Functioning SEZ	
<b>IV. VEGETATION</b>		
V-1	Relative Abundance and Pattern	
V-2	Uncommon Plant Communities	
V-3	Sensitive Vegetation	
V-4	Late Seral/Old Growth (New in 2001)	
<b>V. FISHERIES</b>		
F-1	Lake Habitat	
F-2	Stream Habitat	
F-3	In-Stream Flows	
F-4	Lahontan Cutthroat Trout (New in 2001)	
<b>VI. WILDLIFE</b>		
W-1	Special Interest Species	
W-2	Habitats of Special Significance	
<b>VII. SCENIC</b>		
SR-1	Travel Route Ratings	
SR-2	Scenic Quality Ratings	
SR-3	Public Recreation Area Scenic Quality Ratings	
SR-4	Community Design	
<b>VIII. NOISE</b>		
N-1	Single Event (Aircraft)	
N-2	Single Event (Other)	
N-3	Community Noise	
<b>IX. RECREATION</b>		
R-1	High Quality Recreational Experience	
R-2	Capacity Available to the General Public	

The overarching goal of the EIP is to make progress on environmental threshold attainment. Here is an overview of environmental trends from the 2006 Threshold Evaluation Report published by TRPA.

# Appendix 3

## SUMMARY OF EIP DELIVERABLES

The targets in this appendix are being refined in the EIP Performance Measures Project scheduled for completion in 2010.

ACTION PRIORITY	GOALS	TARGETS	KEY DOCUMENTS
Stormwater City and County Roads	Reduce erosion and pollutant loading from stormwater runoff from local roads in drainages that affect Lake Tahoe	209 miles of local roadways retrofitted	Stormwater Quality Improvement Committee Documents; Formulating and Evaluating Alternatives for WQ Projects- Interim Guidance Document California Jurisdictions' Pollutant Load Reduction Strategy as part of each jurisdiction's adopted Stormwater Management Plan.
Stormwater State Highway	Reduce erosion and pollutant loading from stormwater runoff from State Highways in drainages that affect Lake Tahoe	75 miles of roadways retrofitted	Natural Environment As Treatment (NEAT) planning initiative
Stormwater Forest Service Roads	Reduce erosion and pollutant loadings from stormwater runoff from Forest Service roads in drainages that affect Lake Tahoe.	16 miles of Forest Service roads retrofitted or decommissioned	LTBMU Forest Plan (revision) LTBMU Access and Travel Management Plan
Stormwater Public and Private Facilities	Reduce erosion and pollutant loading from stormwater runoff from public and private facilities in drainages that affect Lake Tahoe.	30,000 private parcels and public facilities retrofitted	
Upper Truckee Restoration	Restore or enhance the natural functions and processes of the Upper Truckee River and its connecting floodplain to reduce negative streamflow impacts to Lake Tahoe clarity, and restore or enhance SEZ wildlife and fisheries habitat.	24,000 linear feet of stream habitat restored or enhanced; 150+ acres of habitat in SEZ (urban and/or nonurban) restored or enhanced  1 watershed assessment completed	Upper Truckee River Watershed Advisory Group Guidelines for UTR Restoration Project Monitoring

CA Priority Watersheds	Restore or enhance the natural functions and processes of streams and their floodplains in CA priority watersheds to reduce negative streamflow impacts to Lake Tahoe clarity, and restore or enhance SEZ wildlife and fisheries habitat.	6,000 linear feet of stream habitat restored or enhanced 90+ acres of habitat in SEZ (urban and/or non-urban) restored or enhanced 5 watershed assessments completed	
NV Priority Watersheds	Restore or enhance the natural functions and processes of streams and their floodplains in NV priority watersheds to reduce negative streamflow impacts to Lake Tahoe clarity, and restore or enhance SEZ wildlife and fisheries habitat.	20,000 linear feet of stream habitat restored or enhanced 24+ acres of habitat in SEZ (urban and/or non-urban) restored or enhanced 2 watershed assessments completed	
Acquiring Environmentally Sensitive Lands	Continue to acquire and restore priority environmentally sensitive lands to protect and conserve the natural environment.	1 or more priority environmentally sensitive lands acquired for conservation  1 or more instance of impervious coverage removed from acquired environmentally sensitive land	
Enhancing Fish and Wildlife Habitat	Enhance fish and wildlife lake habitat associated with fish and wildlife movement corridors.	10 acres of lake habitat restored or enhanced and another 346 acres of contiguous habitat restored or enhanced  1 or more conservation measures taken to protect lake habitat	
Tahoe Yellow Cress	Protect and conserve Tahoe yellow cress (TYC).	Lake-wide inventory of TYC populations conducted and maintained  11 core populations in high priority habitat sites protected  4 new populations in high priority habitat sites established	Tahoe Yellow Cress Conservation Strategy

Lahontan Cutthroat Trout	Restore and recover populations of Lahontan Cutthroat Trout (LCT) within its historic range in the Lake Tahoe Basin.	LCT population reestablished in Lake Tahoe  LCT population reestablished in Fallen Leaf Lake  700 acres of LCT habitat along Upper Truckee River conserved  1,000 acres of LCT habitat in Meiss Meadows conserved	Lahontan Cutthroat Trout Recovery Plan
Other Sensitive Species	Protect critical habitat needed by Special Status Species and Communities of Concern.	1 or more instances of land acquired for special status species habitat protection  1 or more conservation measures implemented to improve special status species habitat  1 or more restorations or enhancements of sensitive special status species habitat	
Invasive Terrestrial Species	Protect the biological diversity of the Lake Tahoe Basin from terrestrial invasive species.	Annual inventories basin-wide of noxious weeds completed  1 or more periodic inventory of other terrestrial invasive species completed  Annual treatment of noxious weeds and other terrestrial invasive species completed 1 or more education programs to reduce the spread of invasive weeds developed and implemented	
Aquatic Invasive Species	Protect the biological diversity of the Lake Tahoe Basin from aquatic invasive species (AIS).	Annual inventories basin-wide of AIS completed  Annual treatment and/or removal of AIS completed  1 or more education programs to reduce the spread of AIS developed and implemented	

Forest Ecosystem Health & Fuels Reduction	Protect forest ecosystem health and reduce forest fuels to acceptable levels.	1,500 acres of SEZ aspen community treatments completed  68,000 acres of forest treated for fuels reduction, including 1,000 acres late seral stage forest treated  9,000 public urban lots maintained for fuels reduction  30,000 private parcels with defensible space measures implemented	Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy  Fuel Reduction and Forest Restoration Plan for the Lake Tahoe Basin
Utilizing Biomass	Improve air quality in Lake Tahoe Basin.	1 or more instances of biomass material diverted out of Lake Tahoe Basin.	
Improving Air Quality by Minimizing Smoke and Dust	Improve air quality in Lake Tahoe Basin.	3,000 noncompliant wood stoves retrofitted  10 high-efficiency street sweepers obtained and in use	
Improving Transit and Trails	Improve air quality in Lake Tahoe Basin.	43 miles of pedestrian and bicycle trails improved or constructed  Transit ridership increased to 3 million passengers	Lake Tahoe Regional Bicycle and Pedestrian Master Plan; TMPO Regional Transportation Plan
Improving Lake Access	Improve public access to lakefront recreational activities in Lake Tahoe Basin.	1 or more existing lakefront access facilities modernized for improved access and resource protection  1 or more instances of new public access  1 or more instances of increased length of public shoreline  1 or more actions taken to address public-private conflicts over lakefront use	
Developing a Comprehensive Trail System	Improve air quality and reduce impact of recreation on environment.	40 trail projects completed	
Improving Recreation Facilities	Improve the quality of recreation facilities and the recreation experience.	40 recreation facility projects completed	

Improving Educational and Interpretive Facilities	Improve the Taylor Creek and Meyers Visitor Centers and implement interpretive/ educational programs.	Taylor Creek Environmental Education Center improved  Meyers Visitor Center improved  3 Basin-wide interpretive/ educational programs developed and implemented	
Improving Scenic Quality of Roadways	Restore and/or enhance scenic quality along Lake Tahoe's scenic roadways.	6 miles of overhead utility lines along scenic roadway units buried underground  500 projects meeting scenic quality standards implemented along scenic roadway units	Scenic Quality Improvement Program  TRPA Design Review Guidelines
Improving Scenic Quality of Shoreline	Restore and/or enhance scenic quality along the shoreline of Lake Tahoe.	150 projects meeting scenic quality standards implemented along Lake Tahoe shoreline.	Scenic Quality Improvement Program

# Appendix 4

## SCIENCE PROGRAM IMPLEMENTATION: THE SCIENCE PROGRAM MANAGEMENT SYSTEM

There has been substantial investment in scientific activities throughout the Lake Tahoe Basin, and the Science Program is intended to guide continued investment. However, there currently is no functioning management system to organize existing resources and activities and to create new procedures as necessary to fully integrate science efforts with resource management in the Basin. In particular, there is a need for the science and management/regulatory communities to collaboratively:

- Identify and prioritize research, synthesis, and other science information needs of management and regulatory agencies
- Establish processes to track and synthesize science efforts
- Convert the analyses and results into knowledge that can then be used to inform decision making.

Within the context of the Environmental Improvement Program, there is a need for the Science Program to provide information essential to improving the effectiveness of the Capital Improvement programs. Moreover, information generated from science activities may also influence management strategies and policy decisions. Implementation of a Science Program Management System is essential to obtaining the information necessary to improve and optimize the rate and degree to which environmental thresholds are achieved. This information also can provide an objective basis for adjusting thresholds.

### ***Purpose***

The purpose of establishing and operating the Lake Tahoe Basin Science Program Management System (SPMS) is to collaboratively:

- 1) Document and regularly implement an adaptable process for prioritizing and allocating funds and resources for science. The system should recognize the diverse science needs of management and regulatory agencies, and should allocate resources compatible with capital program priorities.
  - 2) Establish and clarify roles and responsibilities of the science community, funding entities, and agencies for implementing the management system, such that the Science and Reporting Focus Area maximizes efficiency through integration of efforts, establishment of common methodologies, data aggregation, and unified reporting.
  - 3) Establish procedures to facilitate information exchange and interpretation, and to communicate science results and recommendations so they can inform future management actions and priorities associated with the EIP capital improvement sub-programs/focus areas.
  - 4) Track, summarize, and report on science activities and the capital programs' progress toward achieving regional goals. The resulting information should be relied upon by
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- agencies, stakeholders, and the public to increase their understanding, and to reduce uncertainty in decisions and actions.
- 5) Establish procedures for evaluating research and monitoring efforts, and for making recommendations for change, including amending or adding program elements to improve program performance over time.
  - 6) Establish procedures for documenting the effectiveness of the science program in meeting agencies' science needs and for maximizing coordination and effective communication between agencies and the science community, so that new information gets to decision makers in a timely manner.
  - 7) Ensure the use of current standard methods of research in the Lake Tahoe Basin, such that the best available science and technology is utilized to collect new data, conduct analyses, produce and manage information, and make results available in a timely fashion.

### ***Management System Description***

The EIP Science Program Management System (SPMS) follows an annual Plan > Do > Check > Act cycle and is intended to complement and support that system. It is based on the Generalized Management System Design Manual (Sokulsky and Beierle, 2007) for application to major Tahoe Basin programs. Figure 3 represents the primary steps in the SPMS cycle.

Table 2 provides a detailed description of the specific objectives and activities involved in each numbered box in the cycle (Figure 3), along with the parties involved and the timing of each step. It is recognized that while certain elements of this process are already being implemented, it will take considerable effort, and coordination, among all EIP participants to conduct all of these activities. Roll-out of SPMS will require strategic thinking about the most important components of the system and the degree of effort each step should involve, commensurate with available resources. This will be a factor in each year's round of management decisions concerning the following year's activities.

Although several components of this system are undertaken currently, they are neither fully coordinated (whether that be with other components of the system, or among all the agencies and sectors contributing to the EIP), nor are they systematically integrated into management and policy decision-making. By providing a structure to guide and supplement existing efforts, it is intended that iteratively, over time, we will achieve a fully integrated science program that meets the Science Focus Area goal and objectives. Operating through the SPMS will: 1) ensure funding of science endeavors commensurate with the need and priority, 2) clarify roles among the scientific and governmental communities, 3) inform subsequent actions via standardized syntheses of existing knowledge and fully-vetted recommendations, and 4) ensure that the program continually improves over time.

#### **Roles and Responsibilities: Agencies, TSC and SMIT**

Consistent with the scope of the EIP, the SPMS involves a partnership among numerous parties from a wide variety of public and private sectors. The SPMS by necessity brings Basin management agencies in close communication with the science community, which has been represented in the Basin since 2005 by the Tahoe Science Consortium (TSC). The structure of TSC, and the nature of its interactions with Basin agencies, is represented in Figure 4. A central forum for communication between scientists and agency staff in many SPMS processes is the Science-Management Integration Team (SMIT).

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The SMIT consists of senior government agency representatives from the Tahoe Science Agency Coordination Committee (TSACC) and representatives from the TSC Committee of Scientists (COS). SMIT meetings, which are open to the public, enable these entities to discuss management agency issues and the types of science activities that can help to address those issues, and to regularly update/revise research and monitoring plans for the Lake Tahoe Basin.

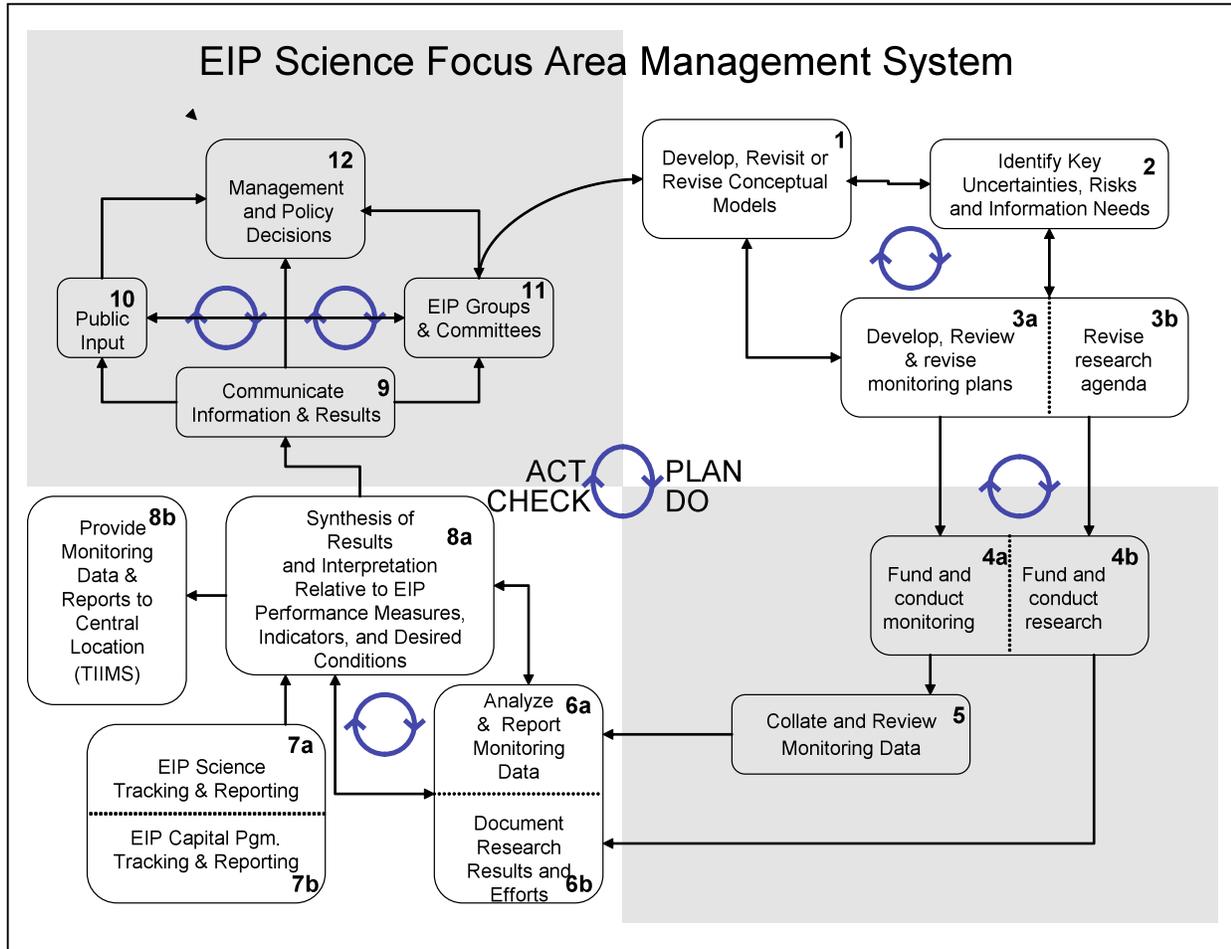


Figure 3 - Annual cycle of activities which constitute a management system for the EIP Science and Reporting Focus Area (Science Program Management System). Circular symbols within each quadrant represent the iterative nature of the associated steps. Although each box in the cycle represents a logical, sequential process, it is recognized that any given action or step in the cycle may require adjacent steps to be re-visited (as also represented by numerous double-headed arrows, indicating the integrated interaction between these related actions).

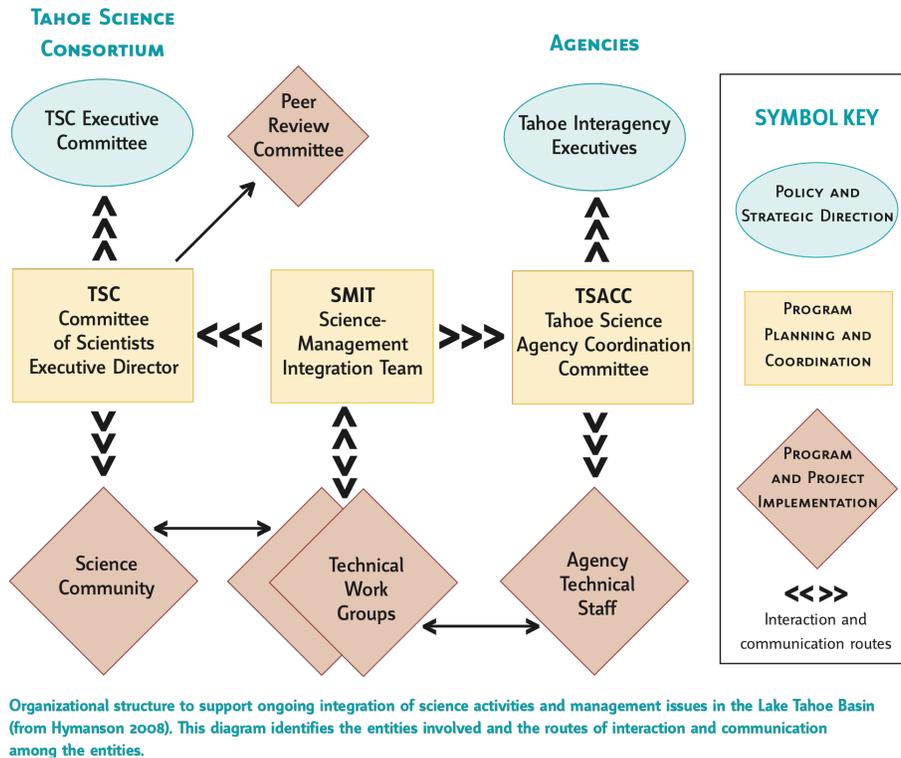


Figure 4. Organizational structure to support ongoing integration of science activities and management issues in the Lake Tahoe Basin (from Hymanson 2008). This diagram identifies the entities involved and the routes of interaction and communication among the entities.

### Example of Management System Operation

An example of how the SPMS might work to determine whether and to what extent EIP capital improvement programs and priorities are affecting environmental thresholds/desired conditions is represented in Figure 5. Many of the projects under the Restoring Watersheds, Water Quality, and Habitat Focus Area are intended to contribute towards achieving the Lake Tahoe Clarity, Ecological Integrity, and SEZ desired conditions. The diagram represents, by means of the upper and lower left-to-right flow-processes, how two EIP programs, stormwater and watershed management, and their associated priorities and project elements, can impact desired conditions. The diagram also indicates the points in the process where various types of monitoring would be conducted to address specific questions.

Applied research is necessary to close the loop in understanding how desired conditions are influenced by actions taken through relevant EIP focus areas, as depicted by the central, right-to-left arrow. Along with monitoring, research must constantly be conducted in order to answer key management questions, such as what processes and factors affect desired conditions, can project design be improved to better target key processes/factors, and can operational models be developed to better predict EIP effects? In some cases, monitoring program design also is a good research topic.

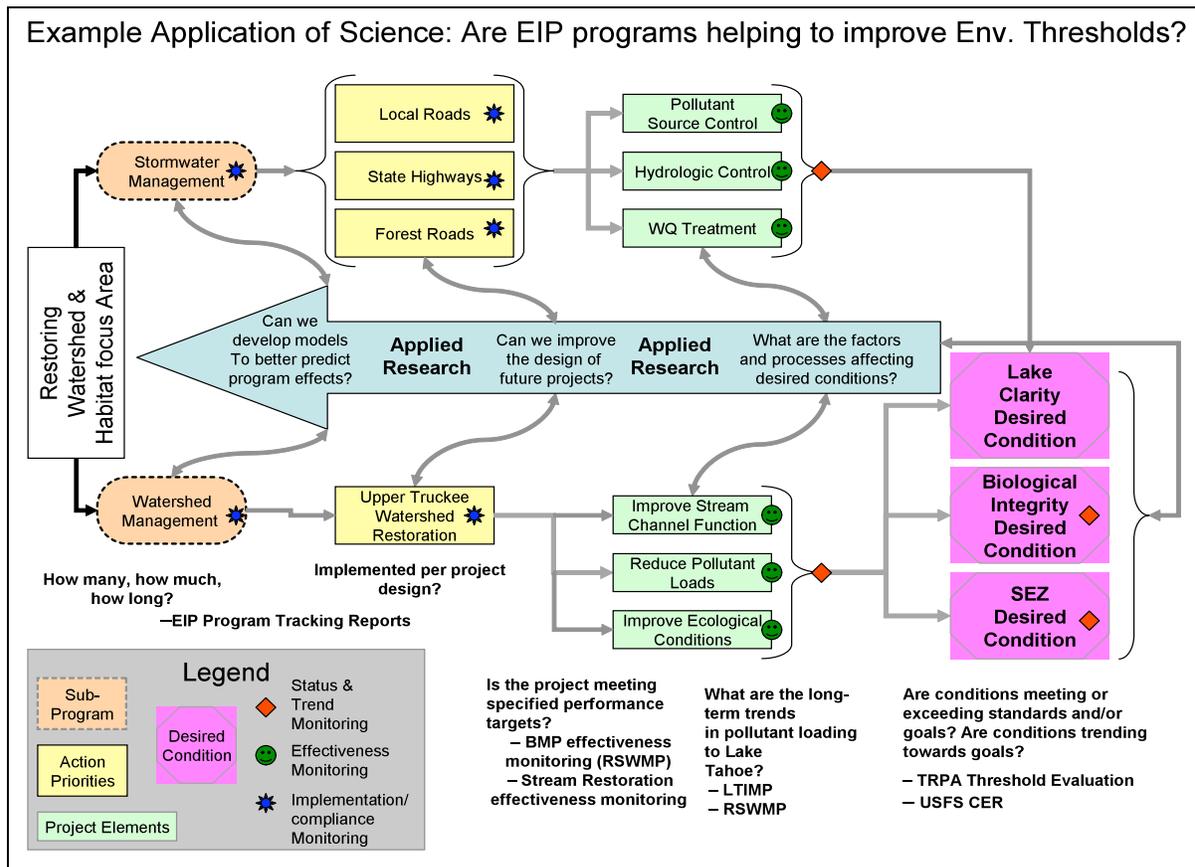


Figure 5. Example of how the science activities might work to determine whether and to what extent EIP capital improvement sub-programs/action priorities are affecting environmental thresholds/desired conditions, including how research and monitoring interact to continually improve programs, projects, and our ability to determine their effectiveness.

## Science Program Funding Strategy

EIP Science program funding is needed to cover the core science programs of monitoring, applied research, and data management, synthesis, and reporting. Implementation monitoring of EIP projects (e.g., permit condition compliance or project tracking) is not included in these core science program costs. Implementation monitoring is the responsibility of the capital sub-programs. The total funding target for the EIP Science sub-program activities is \$91,000,000 over ten years. These funds are estimated to be allocated as follows:

- Monitoring \$61,000,000
- Applied Research \$25,000,000
- Data Management, Synthesis, & Reporting \$5,000,000

Table 1. (See next page) Proposed funding strategy for the EIP Science Program. Proposed funding from each major source is shown for the three major sub-programs of monitoring (effectiveness and status and trends), applied research, and data management synthesis and reporting.

Science Activity	10-yr. funding target (in millions)	Sources of funding (10-yr contributions in millions)*					Comments
		Fed.	CA	NV	Local	Priv.	
Effectiveness Monitoring	\$27 ± 11	Up to 2% of annual capital funding may be invested in effectiveness monitoring.					Investments in effectiveness monitoring come from: 1) Different capital sub-programs, and 2) Responsible parties. Specific funding sources determined on a project-by-project or program level basis. This approach will require select entities to sponsor/administer the monitoring funds. This monitoring is designed to estimate project and program effectiveness. Monitoring may be centralized (completed by a selected entity) or decentralized (completed by various agencies or programs), whichever is most effective. Investments in monitoring will be guided by common/regional monitoring plans (e.g., RSWMP). These plans will be developed collaboratively. Effectiveness monitoring efforts will occur independent of implementation monitoring, but all monitoring results will be available for data synthesis and reporting (see below).
Status and Trends Monitoring	\$34	\$6	\$18.7	\$9.3	--	--	Investments in status and trends monitoring come from baseline monitoring funds allocated to LTBMU (forest plan) and TRPA (regional plan threshold monitoring). TRPA funding of \$28M/10 yrs. would come from CA (66%) and NV (33%) as part of its normal budget process. Development and implementation of the TRPA status and trends monitoring program will be guided by its environmental indicator monitoring and evaluation program.
Applied Research	\$25	\$20	\$2.6	\$2.4	--	--	Investments in applied research assume continuation of existing federal (currently SNPLMA) funding ~\$3M/yr and existing NV (LT License Plate Grant Program) funding of ~\$240K/yr.
Data Mgmt, Synthesis, and Reporting	\$5	\$1.5	\$2	\$0.9	\$0.6	--	Investments in data management, synthesis, and reporting come from: 1) Different capital sub-programs, 2) Responsible parties, and 3) Baseline monitoring funds from TRPA and LTBMU. Funding should provide for a centralized repository of monitoring data (e.g., TIIMS). Synthesis and reporting also could be a centralized activity, or if not, should be done collaboratively. Current TIIMS funding is ~\$400K/yr. An additional \$100K/yr. will be used to support synthesis and reporting work.
<b>Total</b>	<b>\$91</b>	<b>\$27.5</b>	<b>\$23.3</b>	<b>\$12.6</b>	<b>\$0.6</b>		Average of effectiveness monitoring funding range (\$27M) was used to calculate the 10-yr. funding total.

\*Values under "Sources of funding" include any funding currently allocated to science activities that are expected to continue through the next phase of the EIP

## ***Guiding Principles***

Three principles will guide long-term investments in the Science and Reporting Focus Area:

### Stability

The annual funding level must remain reasonably stable from year to year. Stability of funding ensures stability of the infrastructure necessary to operate an effective Science and Reporting Focus Area. The amount of annual funding will affect the amount of science work that may be sustained from year to year. As with the capital projects, there may be some variability in the funding needs from year to year, due to projects with large funding needs. For projects that have large funding needs, it may be necessary to phase implementation over two or more funding cycles to match project needs to the available funding.

### Inflation Proration

The funding process for capital projects and the Science and Reporting Focus Area alike must recognize the potential erosion of EIP accomplishments if funding does not keep up with inflation, including compromising the level of information available from monitoring, erosion of the Science Focus Area infrastructure, and stranding of previous investments. One approach for dealing with inflation is to prorate the funding to match inflation, so that total EIP funding is divided into smaller amounts in the early years and larger amounts in the later years.

### Flexibility

The funding mechanisms should incorporate processes that permit justified changes in program priorities. To ensure continued relevancy, adjustments to the kinds of research and monitoring undertaken must occur in response to changes in management and social priorities and the discovery or emergence of new concerns. To maintain credibility, such adjustments must be objective and transparent and rely on a collaborative decision-making approach that fully involves governmental agencies, the scientific community, and the public.

Table 2. (See next page) Details for EIP Science Focus Area Management System (Applied Research, Effectiveness Monitoring, Status and Trend Monitoring). Box shading indicates quadrants in the SPMS cycle (see Fig. 3). The particular objectives of each box are described, as well as the type of activities or processes involved, the products generated, who should lead and participate in each effort, and when it should occur.

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Science and Reporting Program

Box Number	Box Contents	Objective	Description of activity or process	Timing of activity or process	Products, information, or Outcome	Lead/ Support	Other parties involved
1	Develop, Revisit or Revise Conceptual Models	Common conceptual understanding and identification of uncertainties, information needs, and priorities	Use Tahoe M & E Program – CM and IF Guidance Document to develop and revise DC conceptual models (and indicator framework).	Annually and as necessary August to Sept.	New and revised conceptual models and indicator frameworks	TRPA Science Prg. Mgr/TSC Exec.	SMIT, Public
2	Identify Key Uncertainties, Risks and Information Needs		Document uncertainties and information needs. Review list of science needs and use an established prioritization method to refine annual research list/agenda. Identify and categorize the best approach to address the need as “research”, “effectiveness monitoring” or “status and trend monitoring”, or technical assistance.	Annually, September to October	Annual updated list of prioritized research, monitoring, and technical assistance needs	TSC Executive Director/ TRPA Science Program Manager, Monitoring Program Leads	SMIT, EIP Groups, Public?
3a	Develop, Review & Revise Monitoring Plans (effectiveness & status and trends)	Common agreement on most effective program responses	Using monitoring needs list generated in #2 and knowledge of existing monitoring efforts, document agency resource availability, examine opportunities for integration, Develop new monitoring plans/protocols, review and revise existing monitoring plans as appropriate,	Annually, October to January	Summary document of resource availability and integration opportunities. Recommended new and revised monitoring plans	Monitoring program leads.	SMIT, Agency Monitoring Staff, Researchers, Consultants.
3b	Revise research agendas		Research needs list generated in #2 (above) used to revise near-term research agenda(s). Review list of research needs and use established prioritization method to refine annual research list. Adopt SNPLMA model	Annually, October to January	Updated Science Plan/Research Agenda; new research RFP's	TSC Executive Director; sponsoring agency science program managers	SMIT
4a	Fund and conduct monitoring	Secure funding to carry out research and monitoring agendas	Funding agencies review monitoring plans and needs (from 3a) and confirm/revise funding allocations, as appropriate. This activity includes ID and pursuit of: 1) existing sources of funding, 2) new sources of grant funding, 3) budget revisions, or 4) new legislation. Funding agencies release RFP's or complete contracts for monitoring as appropriate.	Annually, Funding Agency's Fiscal Cycle, February	Funded and implemented monitoring plans, Field efforts commenced or continued per monitoring plan	Funding Agency Executives	Agency Monitoring Program Leads and Capital Project Leads

Science and Reporting Program

Box Number	Box Contents	Objective	Description of activity or process	Timing of activity or process	Products, information, or Outcome	Lead/ Support	Other parties involved
4b	Fund and conduct research		Funding agencies review annual research agenda and allocate funding as appropriate. This activity includes ID and pursuit of: 1) existing sources of funding, 2) new sources of grant funding, 3) budget revisions, or 4) new legislation. Funding agencies release RFP's or complete contracts for monitoring as appropriate.	Annually, Funding Agency's Fiscal Cycle, February	Fund and initiate new research. Field efforts commenced or continued per study design	Funding Agency Executives	TSC Executive Director, TRPA Science Program Mgr, sponsoring agency science program managers
5	Collate and Review Monitoring Data	Convert data into information through data synthesis, analysis, and reporting	Update local monitoring databases, QA/QC, and review data per specified standard operating procedures established in monitoring and evaluation plans. Use secured web-based collaboration software to interact, share and combine data from different monitoring efforts.	Annually by November	Updated local QA/QC databases and metadata	TRPA Science Program Manager for S & T Monitoring/ Effectiveness monitoring program leads	Agency Monitoring Staff, TIIMS Staff
6a	Analyze & Report Monitoring Data		Complete monitoring data analysis per specified procedures established in Status and Trend or effectiveness monitoring and evaluation plans. Agency and TSC created subcommittee to review monitoring synthesis reports and integrate with research results (6b).	Annually, November to January	Draft Monitoring Reports, Post reports on TIIMS or as appropriate	TRPA Science Program Manager for S & T Monitoring/ Effectiveness monitoring program leads	Agency Monitoring Staff, TSC, Consultants, TIIMS Staff
6b	Document Research Results and On-going Research Efforts.		Summarize raw data, conduct statistical analysis, and generate reports and abstracts. Document status of on-going research efforts. Work with the researchers and the agencies to ensure that synthesis projects meet agency needs and are communicated properly.	Annually, December	Completed research published and posted on TIIMS. Summary document of completed and on-going research efforts published.	TSC Executive Director/ Agency reps. funding research; PSW Science Program Coordinator	Researchers, Research Contract Managers, TIIMS Staff
7a	EIP Science Tracking & Reporting		Assessment of research and monitoring efforts and accomplishments, including an accounting of technical assistance efforts. Assess effectiveness of Research and Monitoring programs. Develop	Annually, December	Science Focus Area Assessment Report	EIP Chief/ Monitoring Program Lead/TSC Executive Director	Agency Monitoring Staff, Researchers, TIIMS Team

Science and Reporting Program

Box Number	Box Contents	Objective	Description of activity or process	Timing of activity or process	Products, information, or Outcome	Lead/ Support	Other parties involved
			Management System.				
7b	EIP Capital Program Tracking & Reporting		Assessment of capital program efforts and accomplishments relative to established accomplishment units. Develop Recommendations on adjustments to various capital program implementation strategies.	Annually, December	EIP Capital Program Assessment Report	EIP Chief/ SPG	Agency Program Implementation Staff, Researchers, TIIMS Team
8a	Synthesis of Results and Interpretation relative to EIP Performance Measures, Indicators, and Desired Conditions		Develop integrated report using data and information from 6a, 6b, 7a, and 7b. Include a recommendation and management implication section. If agency-led, conduct independent peer review of integrated report.	Annual, web-based report. or comprehensive report every 5 <sup>th</sup> year March to July	Final Synthesis Report – State of the Tahoe Basin Report	Agency and TSC created work-group	SMIT
8b	Provide Monitoring Data & Reports to Central Web-based Location (TIIMS)		Upload databases and reports (from #6a thru 8a) so they are publically available per specified standard operating procedures established in monitoring and evaluation plans.	Annually July	Updated web-based QA/QC databases and metadata	TIIMS Coordinator/EIP Chief/TRPA Science Program Manager	Monitoring Program Leads
9	Communicate Information & Results	Convert information into knowledge to inform future actions	Science findings presented to agency program managers, stakeholders, & decision makers. Conduct workshops to communicate information from 6a thru 8a.	Annually, April to August	Presentations, Workshops, On-line reports	TRPA Science Program Manager/EIP Chief/TSC Executive Director	SMIT, SPG, Researchers, Agency Monitoring Staff
10	Public Input		Document and summarize input provided by public and stakeholders.	Annually, April	Document that	TRPA Science	SMIT, SPG

Science and Reporting Program

Box Number	Box Contents	Objective	Description of activity or process	Timing of activity or process	Products, information, or Outcome	Lead/ Support	Other parties involved
				to August	Summarizes Public Input	Program Manager/EIP Chief/TSC Executive Director	APC, Agency Boards, Agency Execs
11	EIP Groups & Committees		Recommend prioritized capital project and/or changes to program implementation strategies in response to science results, public input, available funding, and other established criteria. Document rationale for proposed project priorities or changes to implementation strategies.	Annually, Augst to September	Updated priority lists of Capital Projects. Updated Sub-program implementation strategies	EIP focus area leaders; EIP Chief	EIP focus area groups, Agency specialists, SMIT, TRPA Science Prg. Mgr.
12	Management and Policy Decisions		Make adjustments to EIP goals, policies, and management activities (as needed), review and approve project priorities through appropriate processes (e.g., TRPA Governing Board, Plan Amendments, CTC Board, NV State Lands bond allocations, Federal government appropriation process)	Annually, Oct - Jan	Program direction and adjustments. Document decisions and actions	Agency Executives and/or Program Managers/Implementers as assigned by Executives	EIP groups and committees, EIP Chief.

# Appendix 5

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## RESTORATION IN PROGRESS

ENVIRONMENTAL IMPROVEMENT PROGRAM  
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