Resources Related to Benefits of Headwaters Management and Healthy Forests

Improving the Health of California's Headwater Forests [PPIC - September 2017]
(http://www.ppic.org/publication/improving-the-health-of-californias-headwater-forests/)
The strategic removal of high-density smaller trees and fuels is essential to increasing long-term resilience of headwater forests. This will require management, regulatory, and legal reforms. PPIC suggests changes in three areas:

- Make long-term forest health the top priority for guiding agency rules, policy, and management practices.
- Define forest treatment needs and make the most of available funds.
- Make greater use of tools that create opportunities for collaboration.

A Risk Assessment of California's Key Source Watershed Infrastructure
[Pacific Forest Trust – August 2017]
(https://www.pacificforest.org/california-water-security-source-watershed-report/)

- Restoration in California's source watersheds has resulted in 9-16% increases in flows, substantial increases in storage, and positive impacts on the timing, intensity, and rate of release into reservoirs
- Restoring source water infrastructure is a "least-cost" approach to increasing water supply reliability and quality with synergistic benefits that help California adapt to climate change

Protecting Headwaters [PPIC –October 2016] (policy briefer)
(http://www.ppic.org/content/pubs/report/R_1016JM4R.pdf)

- Upper watersheds are California's natural infrastructure
- Headwater forests face extreme wildfire risk
- The natural infrastructure of upper watersheds needs repair
- Strategies:
    - Reintroduce fire and forest thinning as management tools
    - Fund and implement existing forest plans
    - Identify other funds for forest management
    - Develop pilot programs to assess water supply and quality benefits
    - Consider investments in forest product infrastructure
    - Reduce urban encroachment on wildland areas
    - Develop integrated watershed plans

Sierra Meadows Strategy [CalTrout – November 2016]
(http://caltrout.org/book/sierra-meadows strategy/files/downloads/Sierra_Meadow_Strategy_full_report_SHAREABLE_mid.pdf)

- The Sierra Meadows Partnership proposes an "all-lands and all-hands" approach with an overarching goal of restoring and/or protecting 30,000 acres on all lands in the Sierra Nevada
- Approach 1 – Restore and protect meadows to achieve desired conditions
- Approach 2 – Enhance regulatory and institutional funding capacity and coordination
- Approach 3 – Increase and diversify institutional and partnership capacity for meadow restoration and/or protection in the greater Sierra

Estimating the Water Supply Benefits from Forest Restoration in the Northern Sierra Nevada [The Nature Conservancy – March 2015]
(https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/california/forest-restoration-northern-sierras.pdf)

- This report examines the extent to which investing in forest and meadow restoration could increase water supply and improve the timing of water availability.
- If current scale of forest restoration is increased three-fold, there could be up to a 6 percent increase in the mean annual streamflow for individual watersheds
- Economic benefits from increased hydropower generation and water uses are sufficient to cover between one-third and the full cost of thinning, assuming a low or high water response to forest thinning

Improving the Resiliency of California's Headwaters [ACWA – February 2015]
(https://www.acwa.com/resources/recommendations-for-californias-headwaters/)
Developed by ACWA's Headwaters Framework Working Group, the policy document details the role that headwaters play in California's water management system, outlines the benefits of healthy headwaters, identifies current challenges and provides a brief history of headwaters management.

Effects of Meadow Erosion and Restoration on Groundwater Storage and Baseflow in National Forests in the Sierra Nevada, California [USFS (and NFWF and DWR) – June-2015]
(https://meadows.ucdavis.edu/files/FS_Hydrologic_Assessment_Meadow_GW_Final_report_June_2015.pdf)

- Restoration of all eroded meadows on National Forests in the Sierra Nevada could provide an additional 42,800,000 m^3 of annual groundwater storage, roughly equivalent to 2% of the average annual water delivery from the State Water Project

Mokelumne Watershed Avoided Cost Analysis [TNC, SNC, USFS – April 2014]
(http://www.sierranevada.ca.gov/our-work/mokelumne-watershed-analysis)

- Fuel treatments can significantly reduce the size and severity of wildfires
- The economic benefits of modeled fuel treatments are 2-3 times the cost
- There are many beneficiaries from increased fuel treatments, especially taxpayers

Looking to the Source: Watersheds of the Sierra Nevada
[Sierra Nevada Conservancy – 2011]
(http://www.sierranevada.ca.gov/our-region/ca-primary-watershed/our-region/docs/waterreport.pdf)

- Sierra Nevada is the point of origin for a portion of the drinking water supply for more than 23 million Californians, as well as a significant number of Nevadans
- Many of California's urban areas are dependent upon the Sierra for their water, for example 85% of San Francisco's water originates in the Tuolumne River Watershed
- Sierra Nevada should be a prominent element in the Delta health discussion. Approximately half of the water that flows into the Sac-SJ Delta originates in the Sierra
- Restoring forest and watershed health, including reducing the risk and consequence of large damaging fires is a critical part of protecting our state's water supply
- Water from the Sierra directly supports jobs and job creation – in agriculture: farming, ranching and dairy; in industry: energy, fuel, and construction; and in tourism and recreation

**This is not intended to be a comprehensive list, but is a selected group of recent publications that may be of value to resource managers seeking to understand more about the connection of healthy headwaters and the protection of natural infrastructure to water supply, water quality, and other benefits