

## 2.80 Eben Swain

The model/tool I would like to highlight is the Resource Investment Optimization Model (RIOS). RIOS provides information on management decisions that help inform watershed planning and policy in the Truckee River basin through stakeholder engagement, scenario development and impact evaluation depending on specific restoration actions taken within the watershed. In this study, specifically we evaluated the water quality and quantity impacts of five restoration and land protection scenarios in the Truckee River watershed. We used spatially explicit biophysical models to create scenarios with targeted areas where the greatest water quality and supply benefits could be realized. We then quantified how these scenarios would impact the sediment load, nitrogen and phosphorus loading as well as the annual water yield in conjunction with various hydrologic models.

Highlights of the modeling effort include:

- o Identification of targeted locations for collaborative investment across jurisdictional boundaries.
- o Increased investment can be realized based on cost effectiveness that will improve sediment reduction
- o Based on model results, sediment load could be reduced by 22% through implementation of restoration activities in key target areas of the watershed
- o Incorporating climate change scenarios shifted model-generated activity locations slightly.
- o Analysis of various scenarios related to restoration activities informs the type, amount, and location of conservation investments.

A couple of web links related to the RIOS model include:

<http://www.sciencedirect.com/science/article/pii/S1462901116305640>

[http://www.nnwpc.us/files/agendas/20140305/dist\\_Item%206\\_Optimizing\\_Restoration.pdf](http://www.nnwpc.us/files/agendas/20140305/dist_Item%206_Optimizing_Restoration.pdf)

# Optimizing Restoration Investments in the Truckee Watershed

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# Lots of Restoration Investments in Truckee Watershed



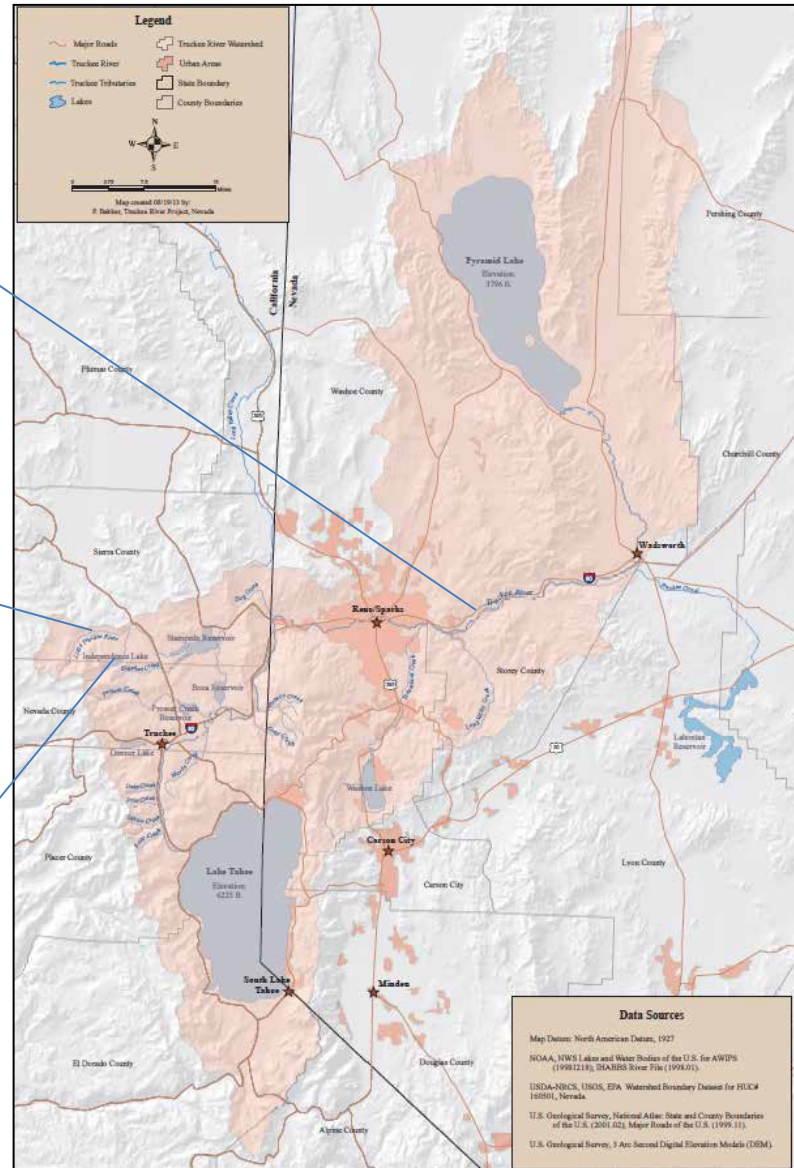
Stream restoration - McCarran



Meadow restoration - Perazzo

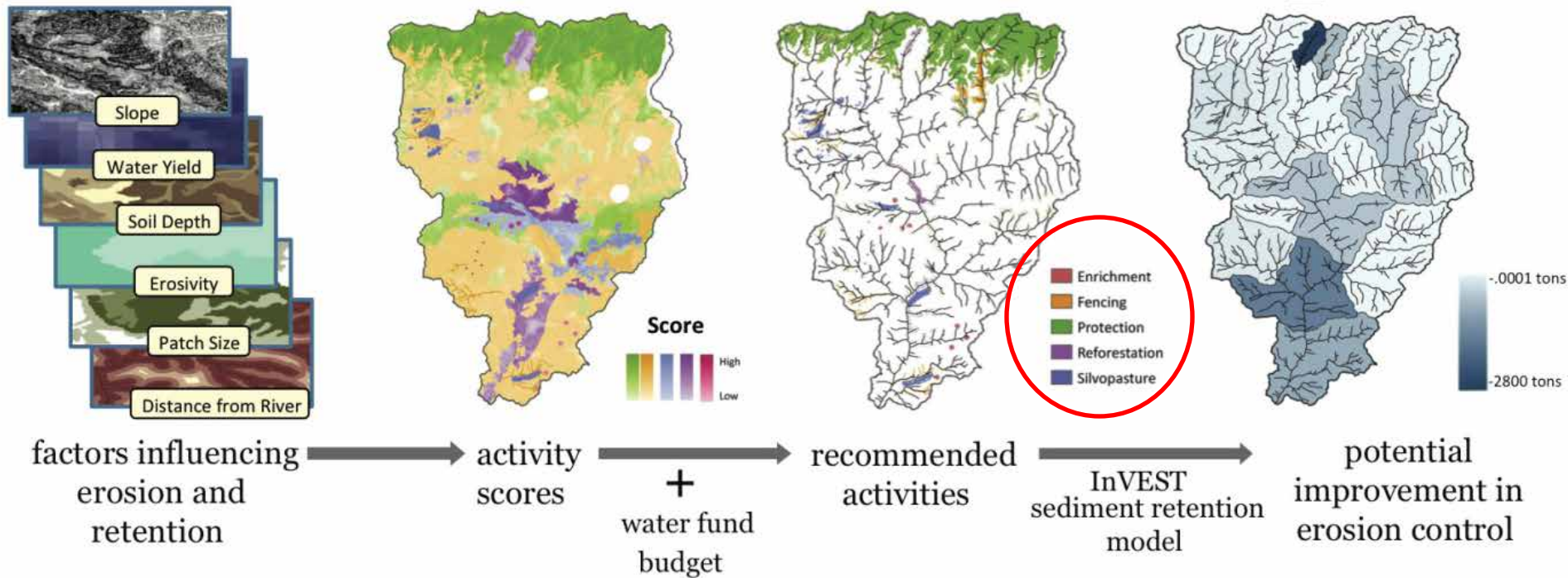


Forest restoration – Independence Lake





# Resource Investment Optimization System



Combines biophysical, social, and economic data to identify best locations for protection and restoration to maximize the ecological return on investment.



# Water Benefits from Restoration Economic Study



**Forest Restoration**



**Land Conservation**



**Meadow Restoration**

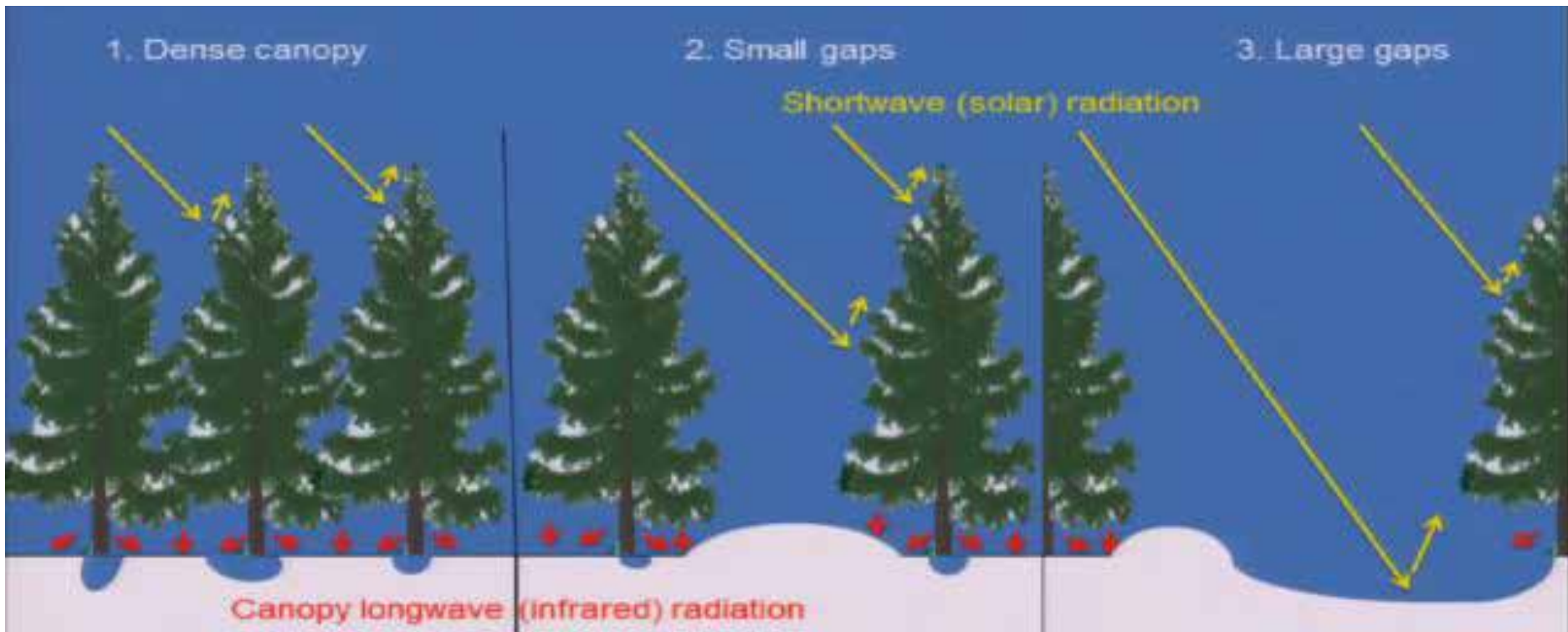
**76,544 acres**

**17,896 acres**

**2,450 acres private;  
1,885 acres private**

# Science and Economics of Water Benefits

## Forest Restoration



# Science and Economics of Water Benefits

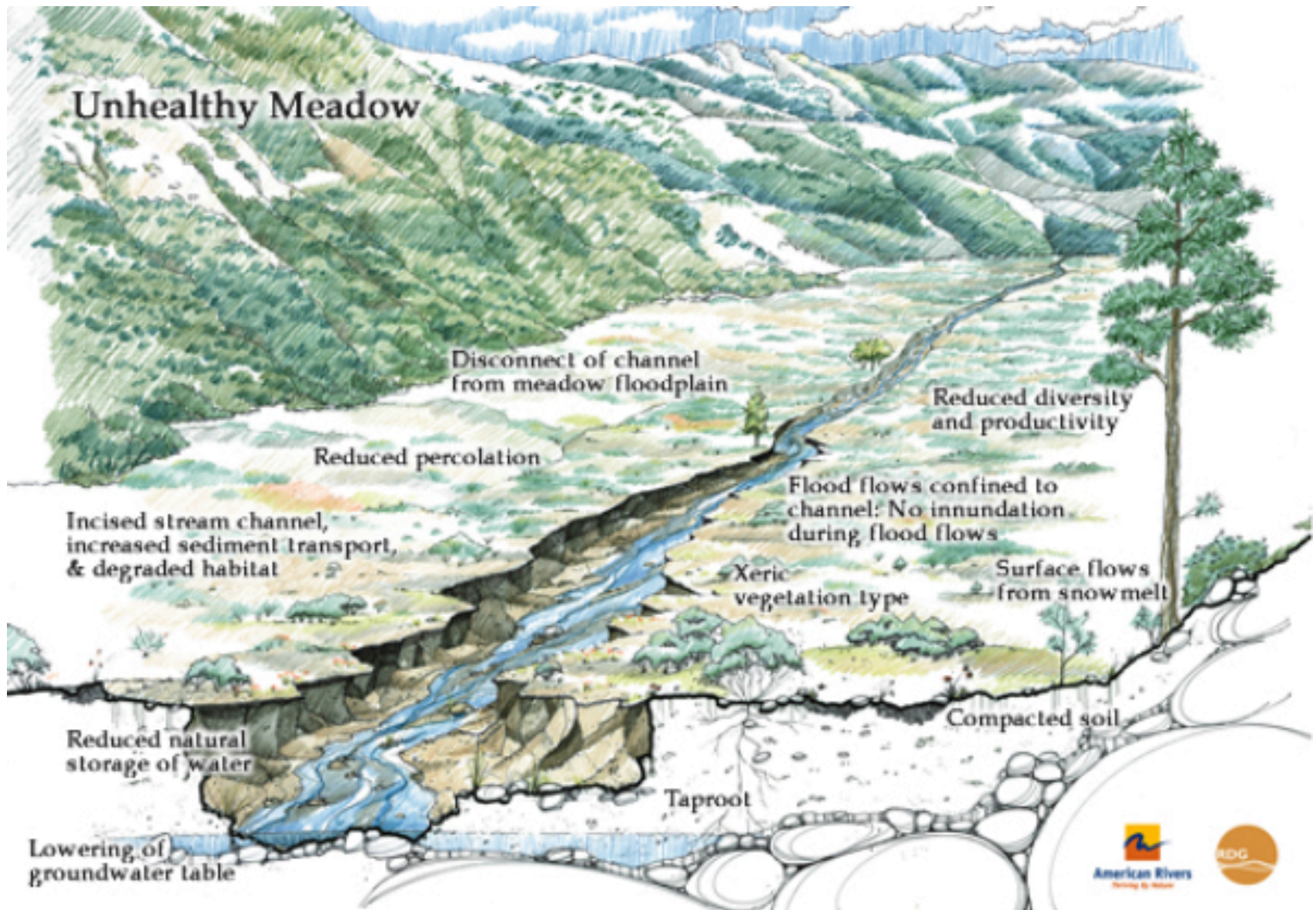


**Forest Restoration**



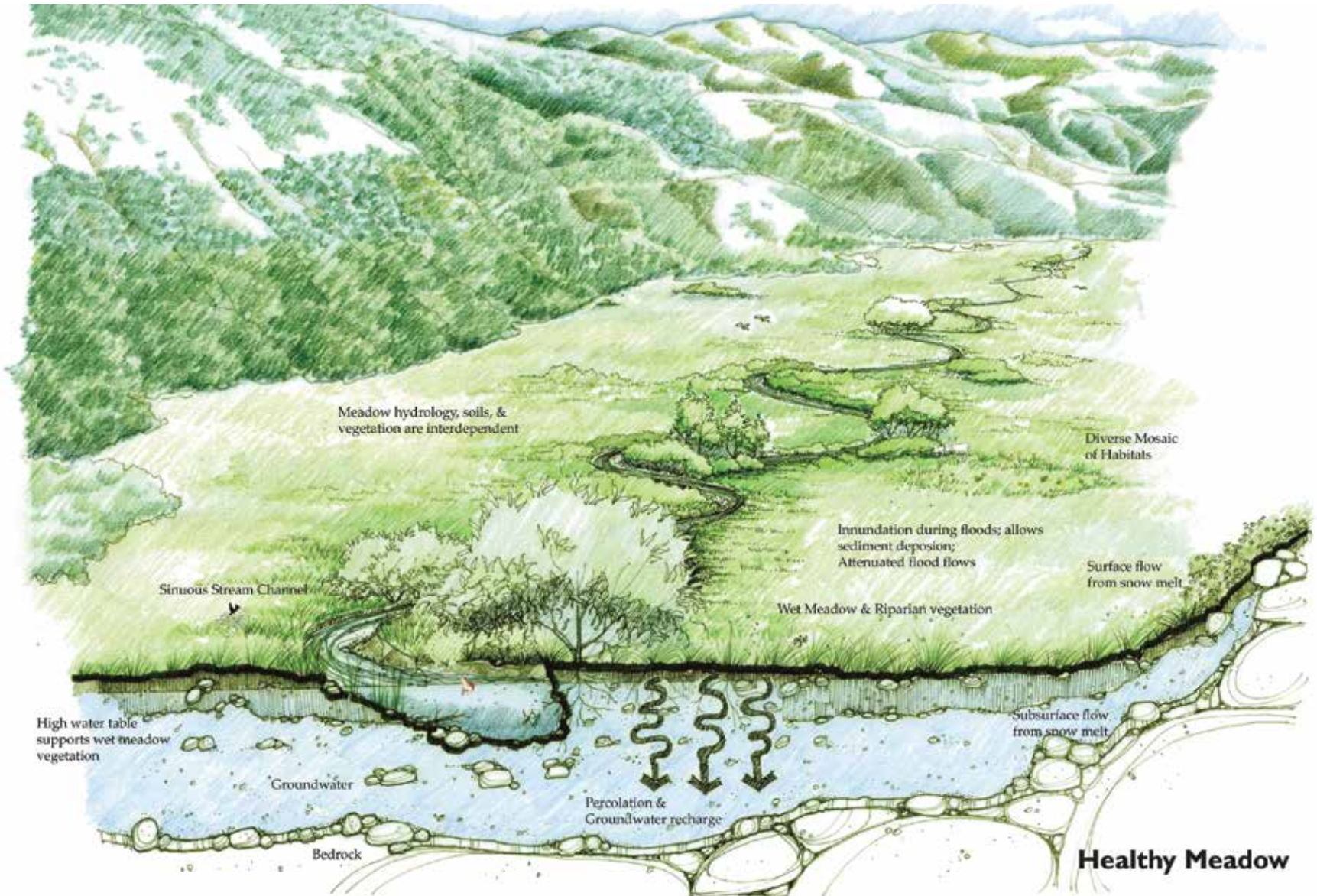


# Science and Economics of Water Benefits





# Science and Economics of Water Benefits



# Science and Economics of Water Benefits



**Forest Restoration**



**Land Conservation**



**Meadow Restoration**

**0.1-0.4 AF/acre  
increase in water**

**7,654-30,618 AF**

**0.01-0.6 AF/acre  
increase in water**

**213-2,130 acre feet**

**0.5-0.7 AF/acre  
shift in water timing**

**943-1,320 acre feet**

1 Acre Foot (AF) = 325,851 gallons



# Water Benefits from Restoration Economic Study



Forest Restoration



Land Conservation



Meadow Restoration

**\$200-\$1,000/acre**

**\$566-801/acre**

**\$1,869-\$2,514/acre**

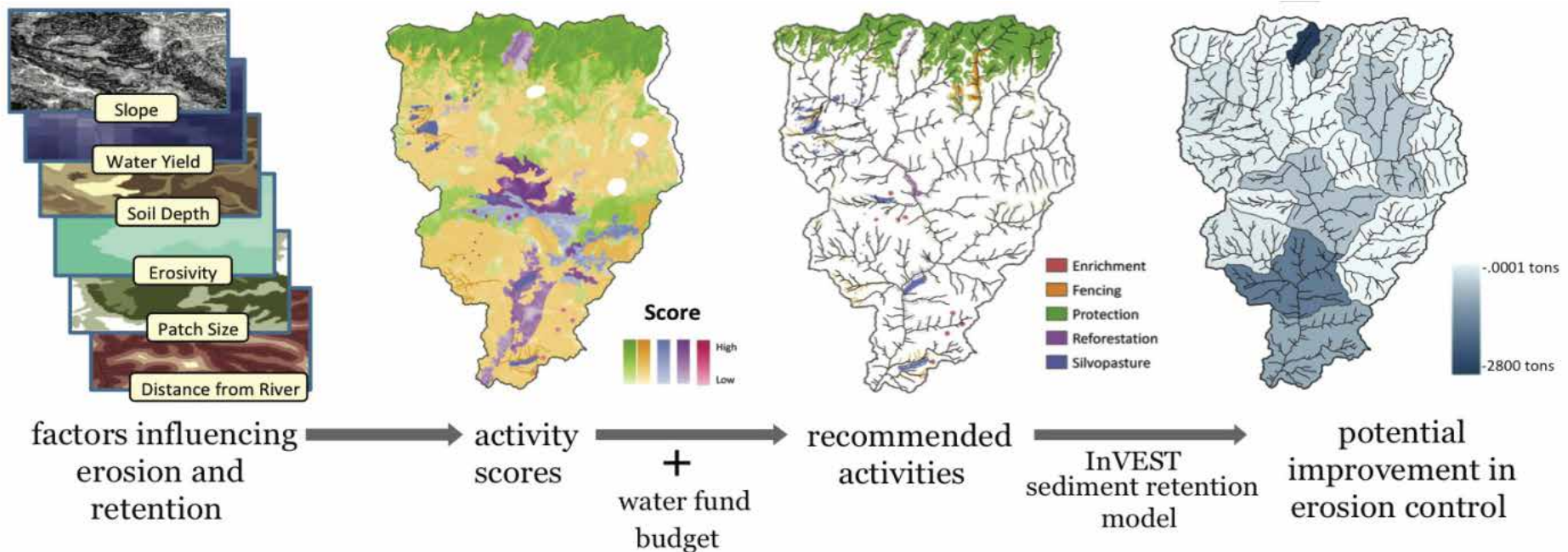
**\$50 million (1/2 land conservation)**

**Benefit - Cost Ratio = 50-75%**

# Optimizing Restoration Investments

Which set of watershed investments (in which activities, and where) will yield the greatest returns towards multiple objectives?

What change in ecosystem services can I expect from these investments?





# Optimizing Restoration Investments

<i>National Fish and Wildlife Foundation</i>	<b><i>\$227,700</i></b>
<i>The Nature Conservancy</i>	<i>\$121,325</i>
<i>Truckee River Fund, TMWA</i>	<i>\$32,775</i>
<i>Northern Nevada Water Planning Commission</i>	<u><i>\$58,075</i></u>
<i>Total</i>	<i>\$439,875</i>

# Optimizing Restoration Investments

Summer 2014-Spring 2016

- Data collection to run model
- Stakeholder engagement with key public and private partners.
- Model Development – develop scenarios for restoration activities that will maximize water yield and quality in the headwaters in the most cost-effective manner.