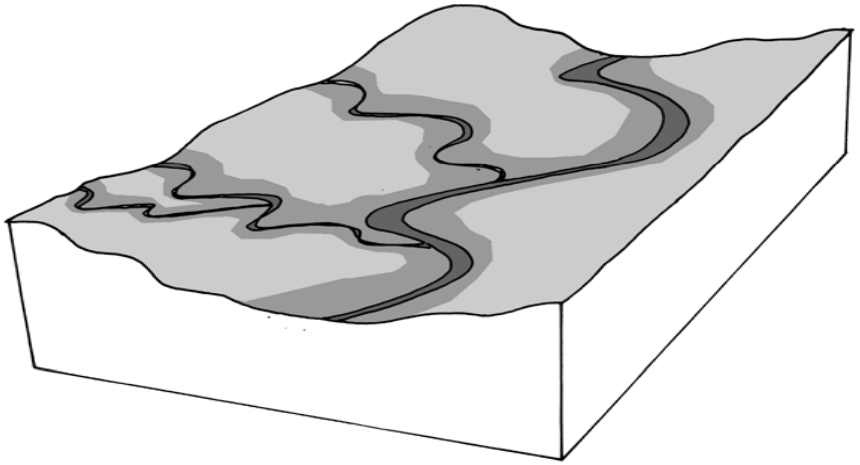
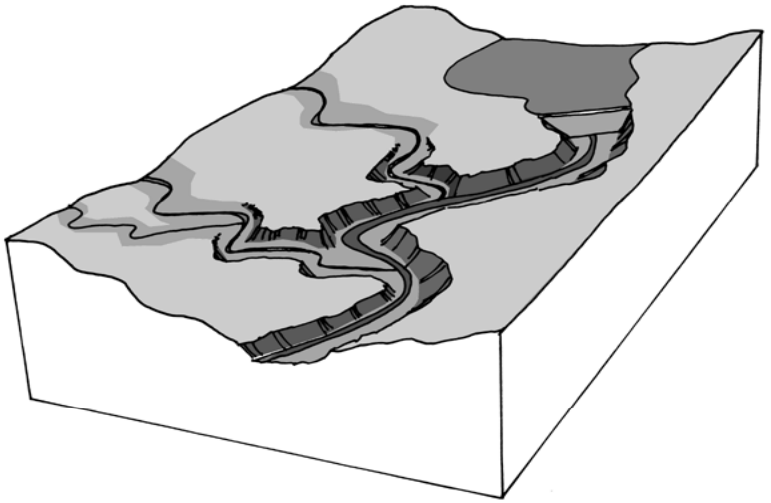
PARSONS AND MORRISON CREEKS

Groundwater effects on stream revegetation

CALIFORNIA LAND STEWARDSHIP INSTITUTE

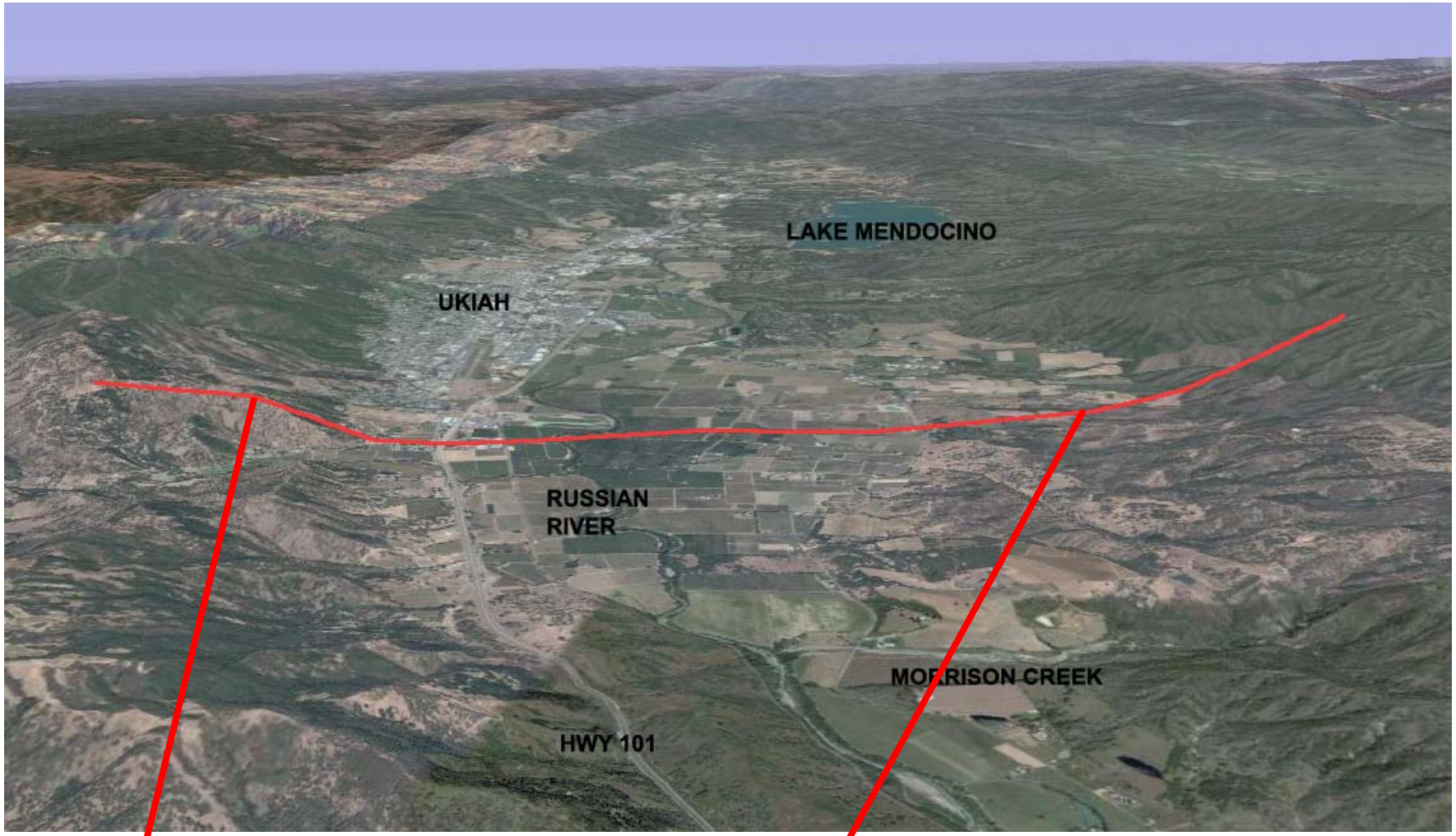
The Upper Russian River drains an alluvial basin flanked by mountains. Lake Mendocino was built 50 years ago and has significantly altered the Russian River channel and its hydrology. These changes cannot be ignored when looking at stream flow and fish habitats.

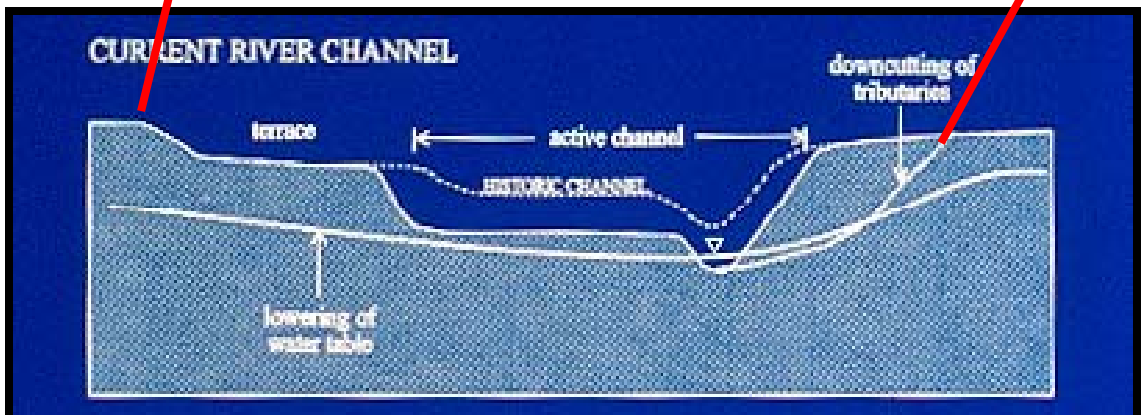




Coyote Dam has cut off sediment movement into the river causing the Russian River channel to incise or entrench nearly 20 feet into its alluvial floodplain. This change alters the timing of connected stream flow for fish to move between tributaries and the main river channel.

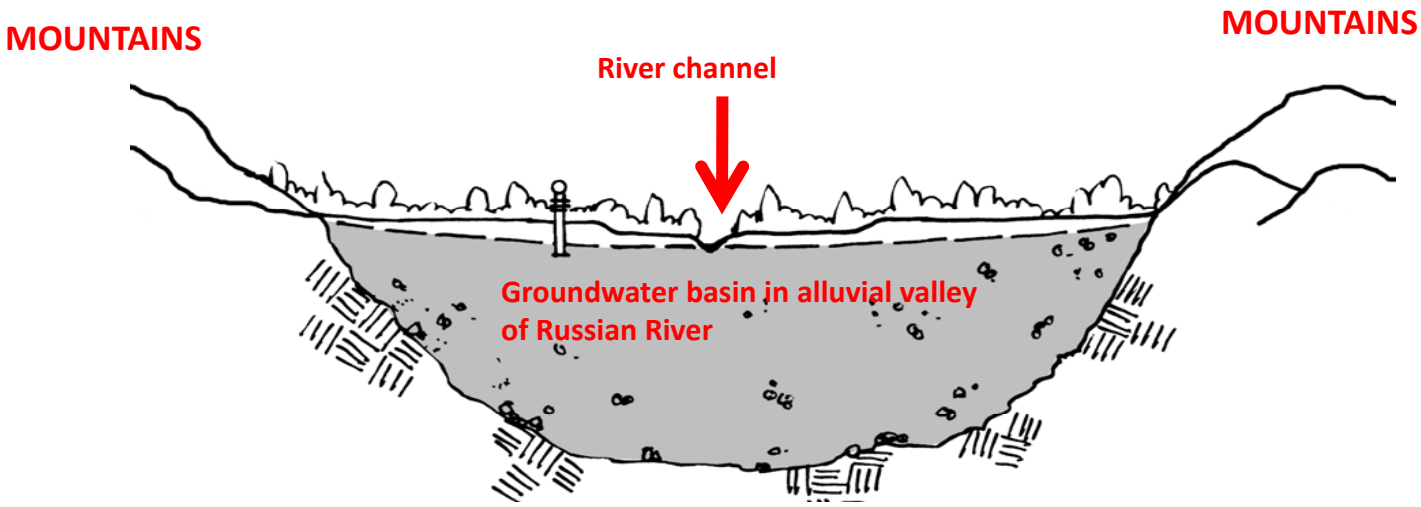
Channel entrenchment on the Upper Russian River is easily visible along the entire alluvial valley from the Dam to Hopland. The channel has dropped 20 ft with significant bank failures and loss of habitat and numerous bridges have been undercut and had to be replaced.



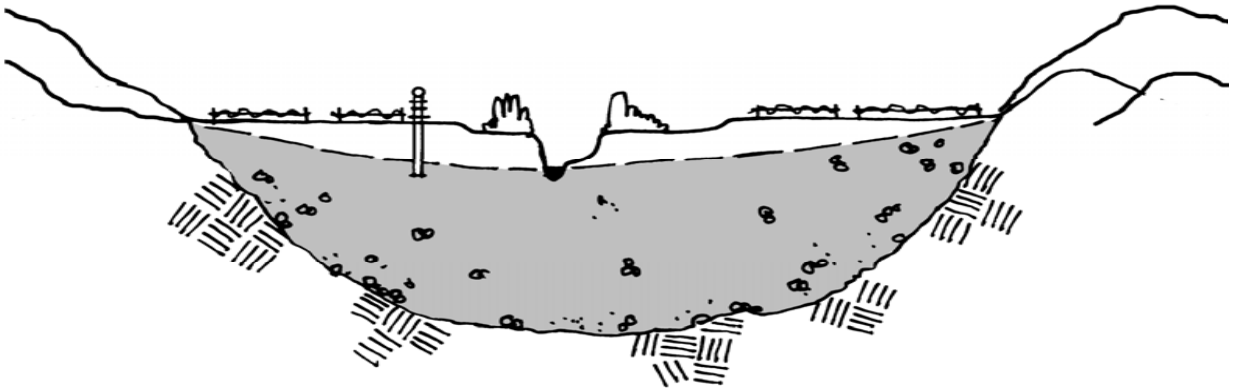


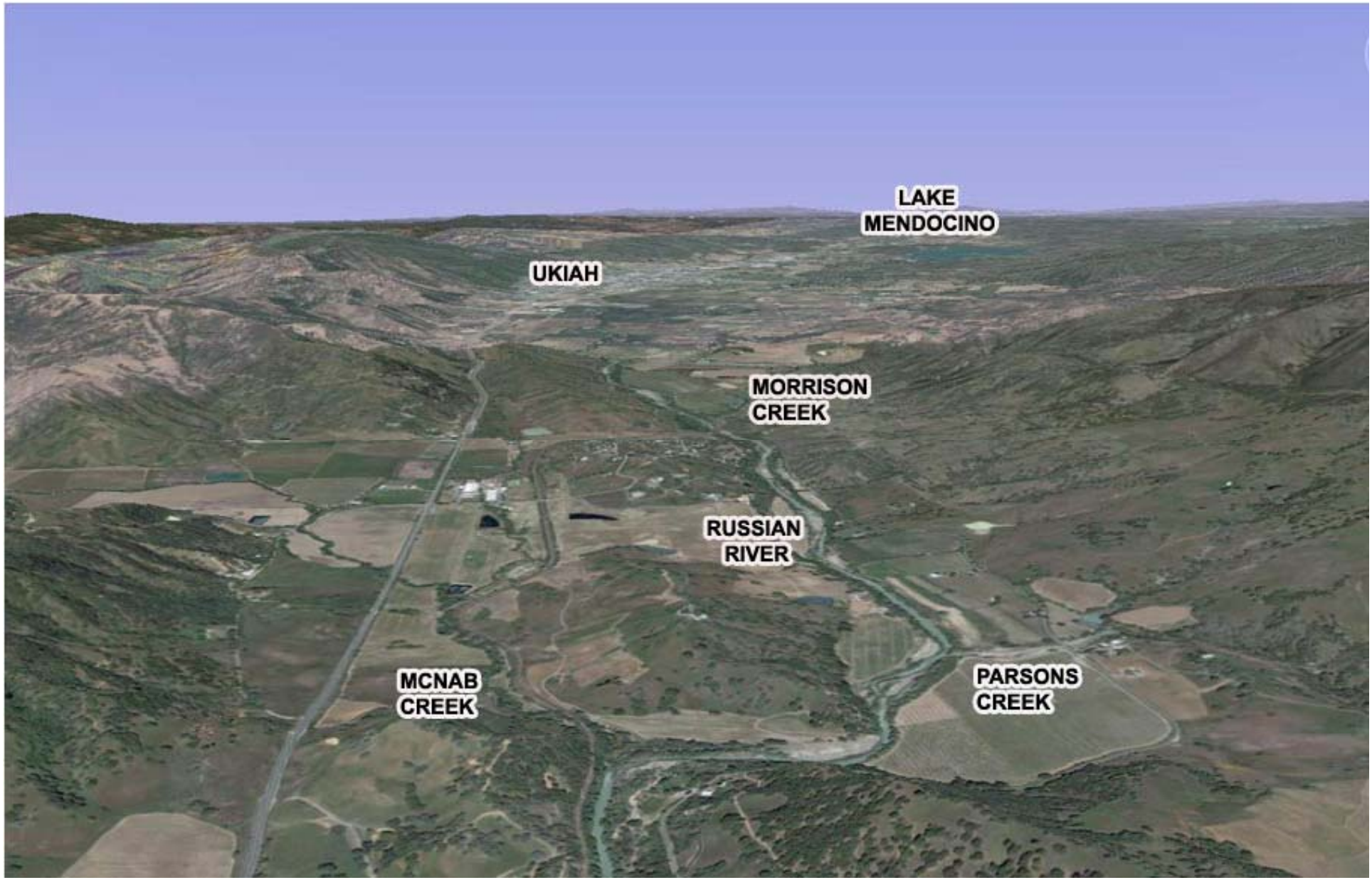
Channel entrenchment affects groundwater levels and therefore the timing and magnitude of stream flow

RIVER CHANNEL AND GROUNDWATER BASIN PRIOR TO ENTRENCHMENT

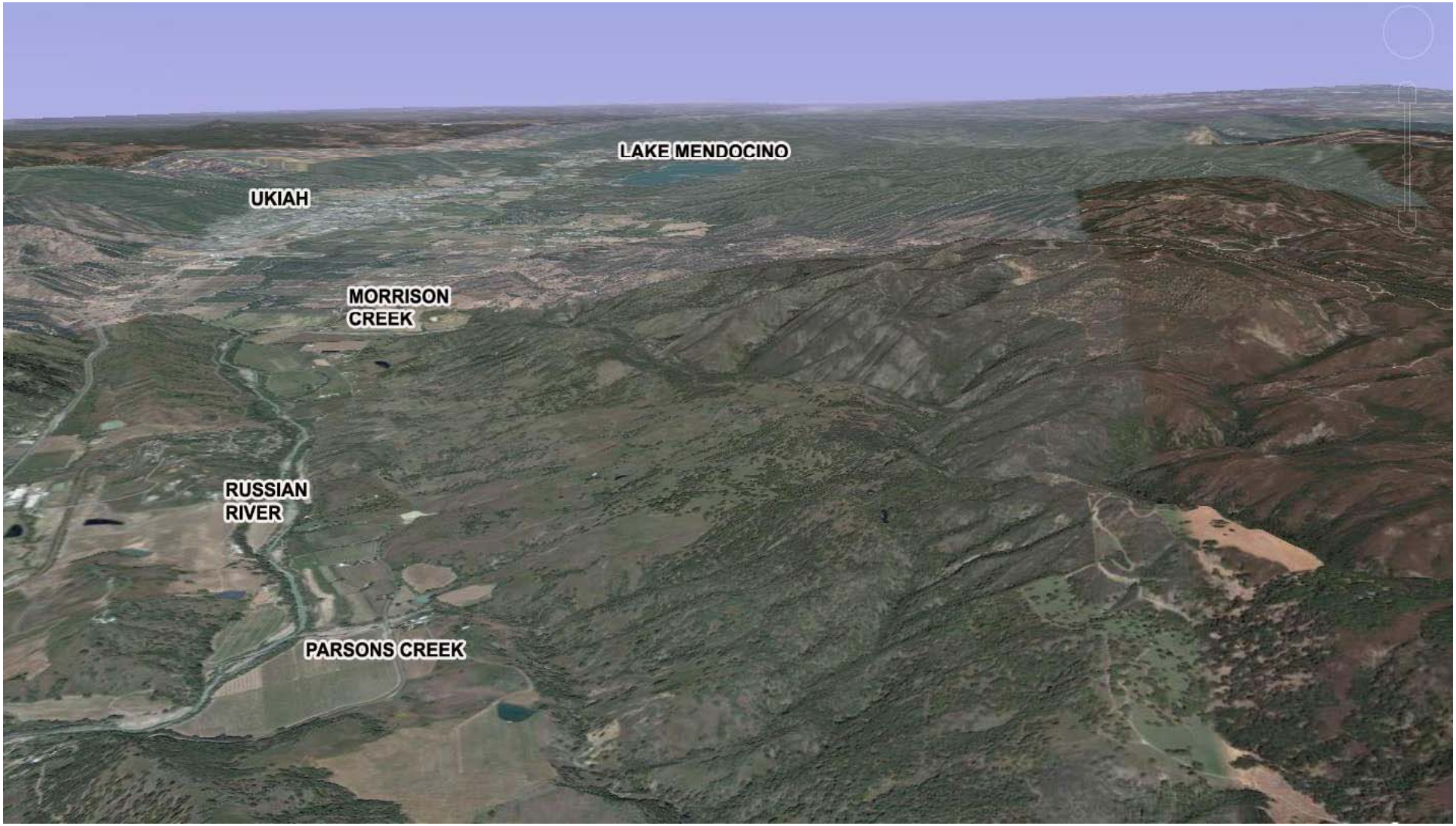


RIVER CHANNEL AND GROUNDWATER BASIN AFTER ENTRENCHMENT – SIGNIFICANT SYSTEM-WIDE CHANGE





In 2001 the shallow groundwater levels of Morrison and Parsons Creeks were monitored to determine why riparian vegetation would not establish on these creeks

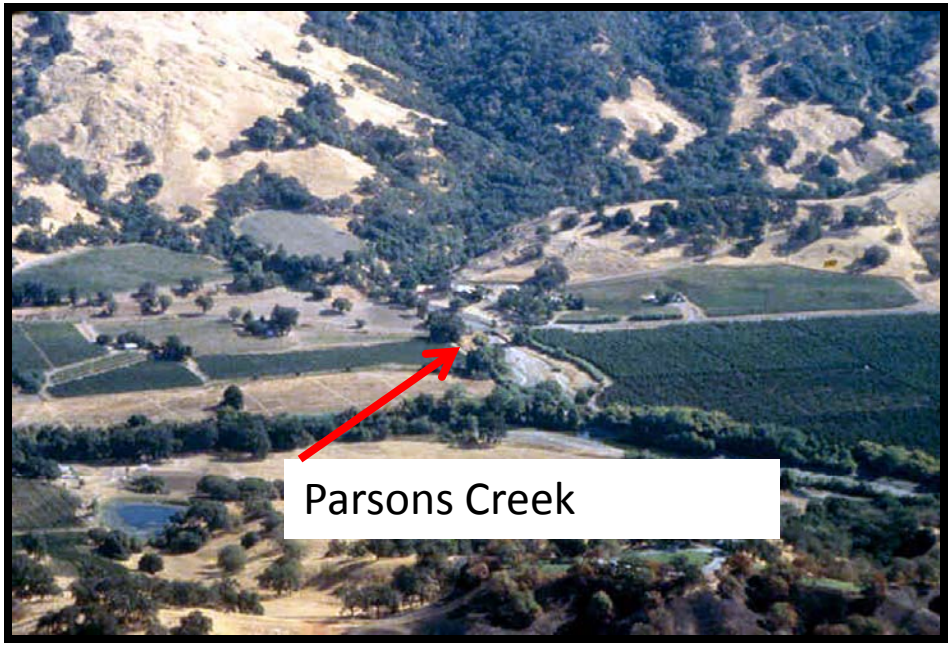


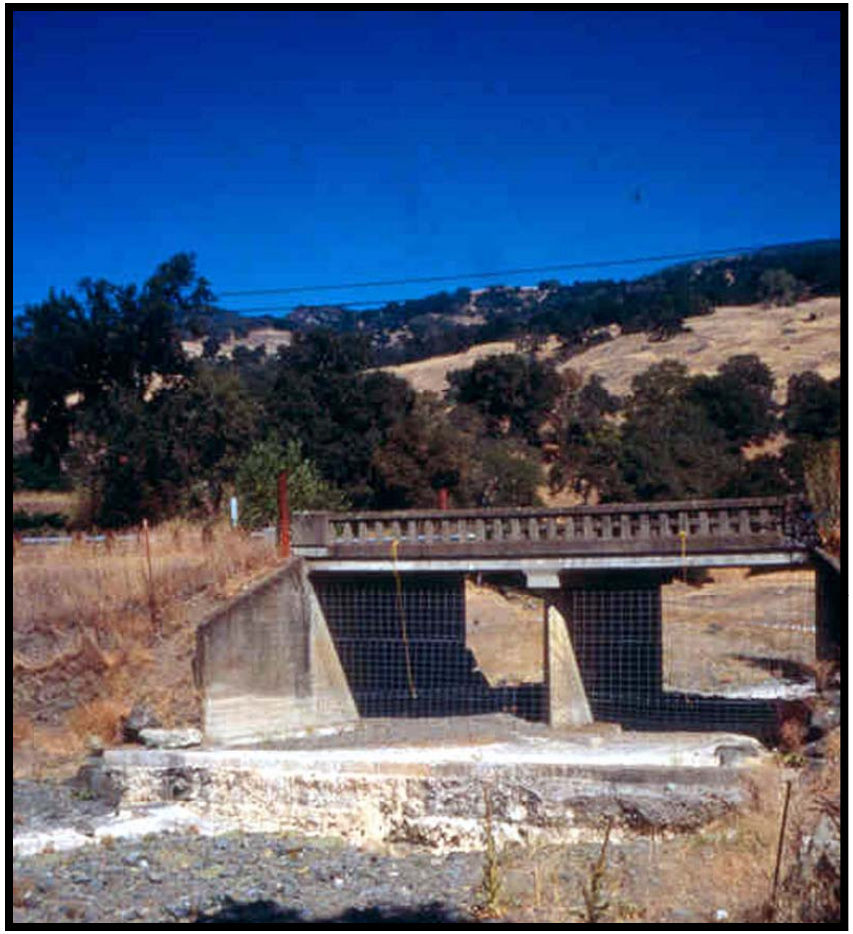
Morrison and Parsons Creeks both drain the steep mountains on the east side of the Ukiah Valley then spill out on to the alluvial valley to meet the Russian River. The monitoring was done in the alluvial valley reach of each creek. Morrison Creek has no reservoirs to affect flows and Parsons Creek has two small ponds.

The Parsons and Morrison Creeks watersheds are dominated by the Maacama Fault and steep mountains


Morrison Creek

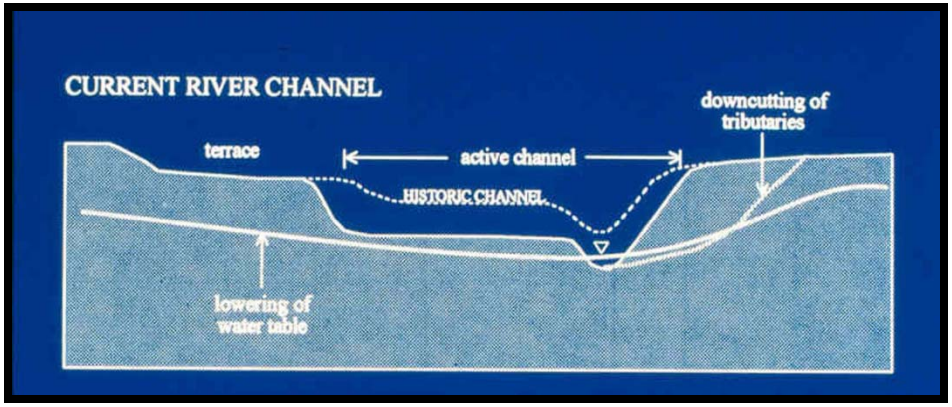

Morrison Creek

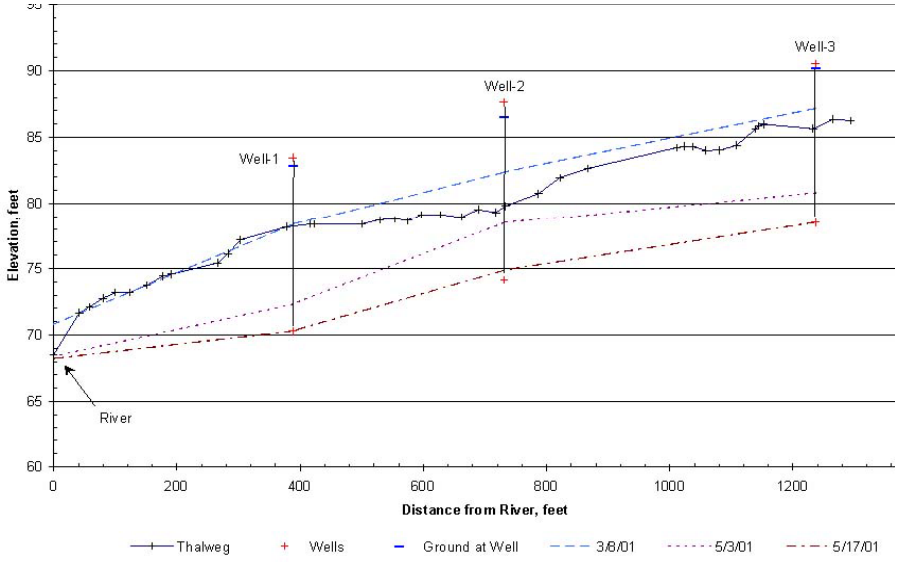

Parsons Creek



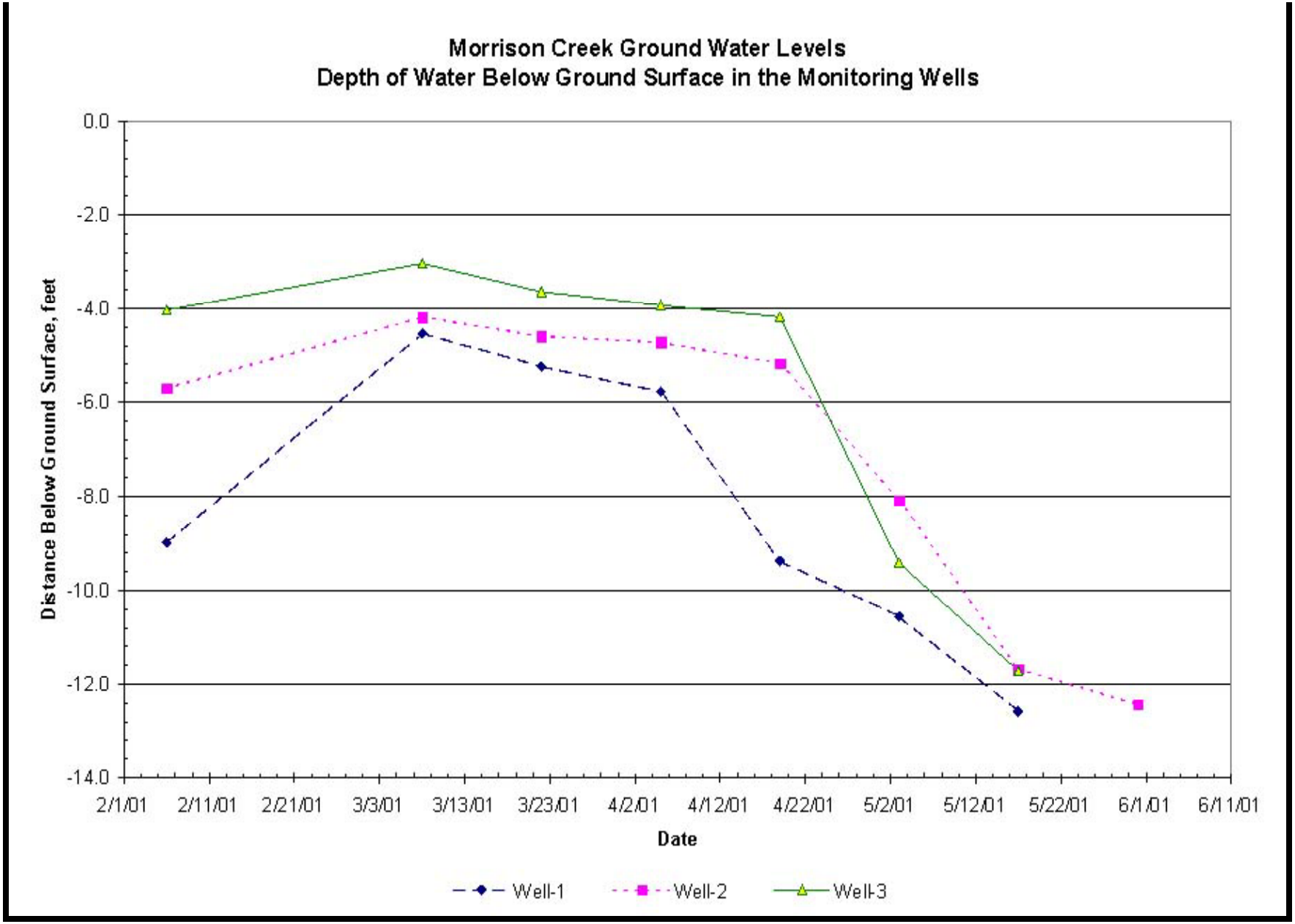
Public road bridge on Parsons Creek shows the effects of channel entrenchment in the main Russian River moving up the tributaries and eroding the tributary channel until a hard point (the bridge) is reached.

Landowner explains that the mark on the upstream side of the Old River Road bridge indicates where the gravel bed of the creek used to be.

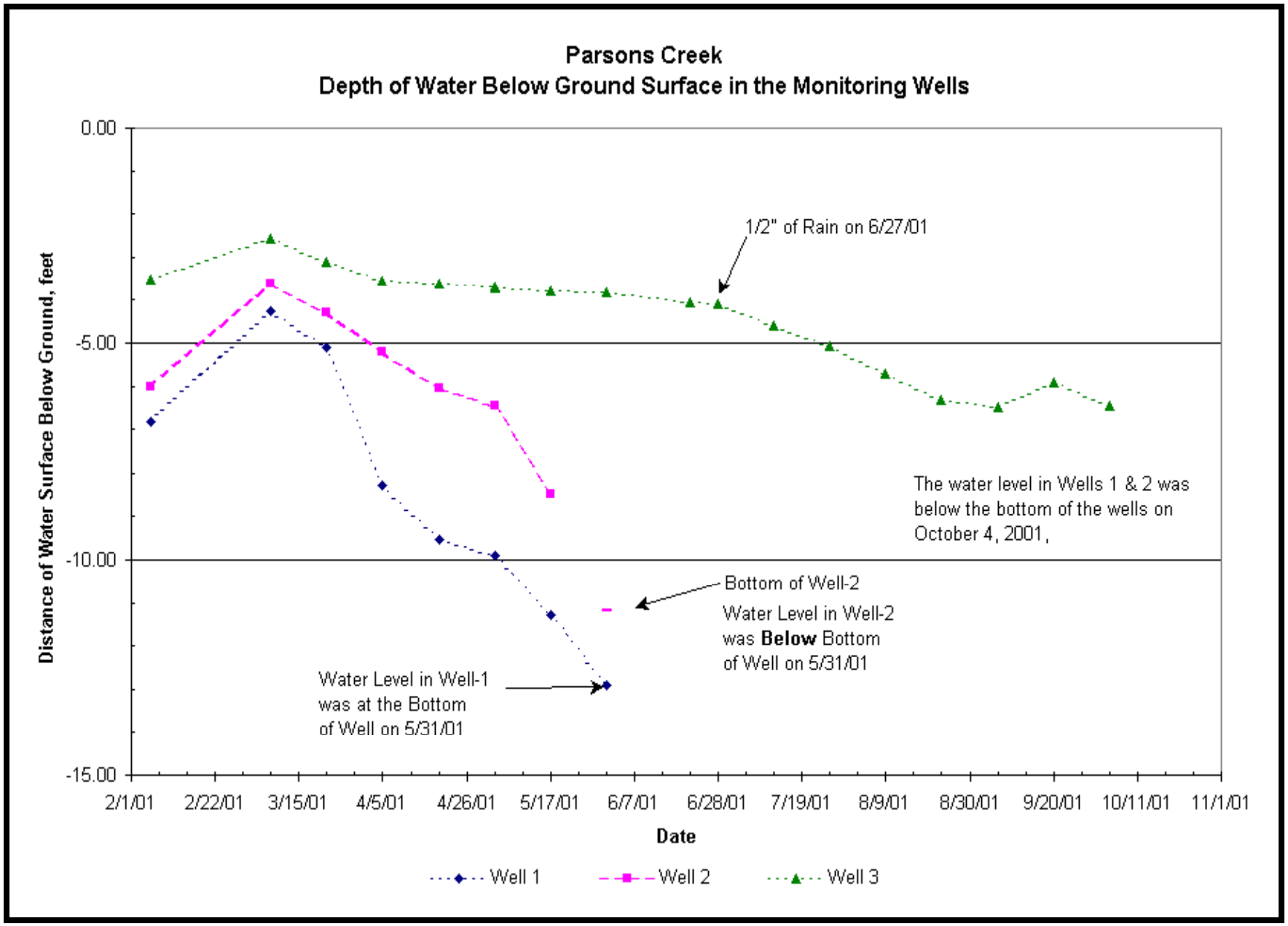




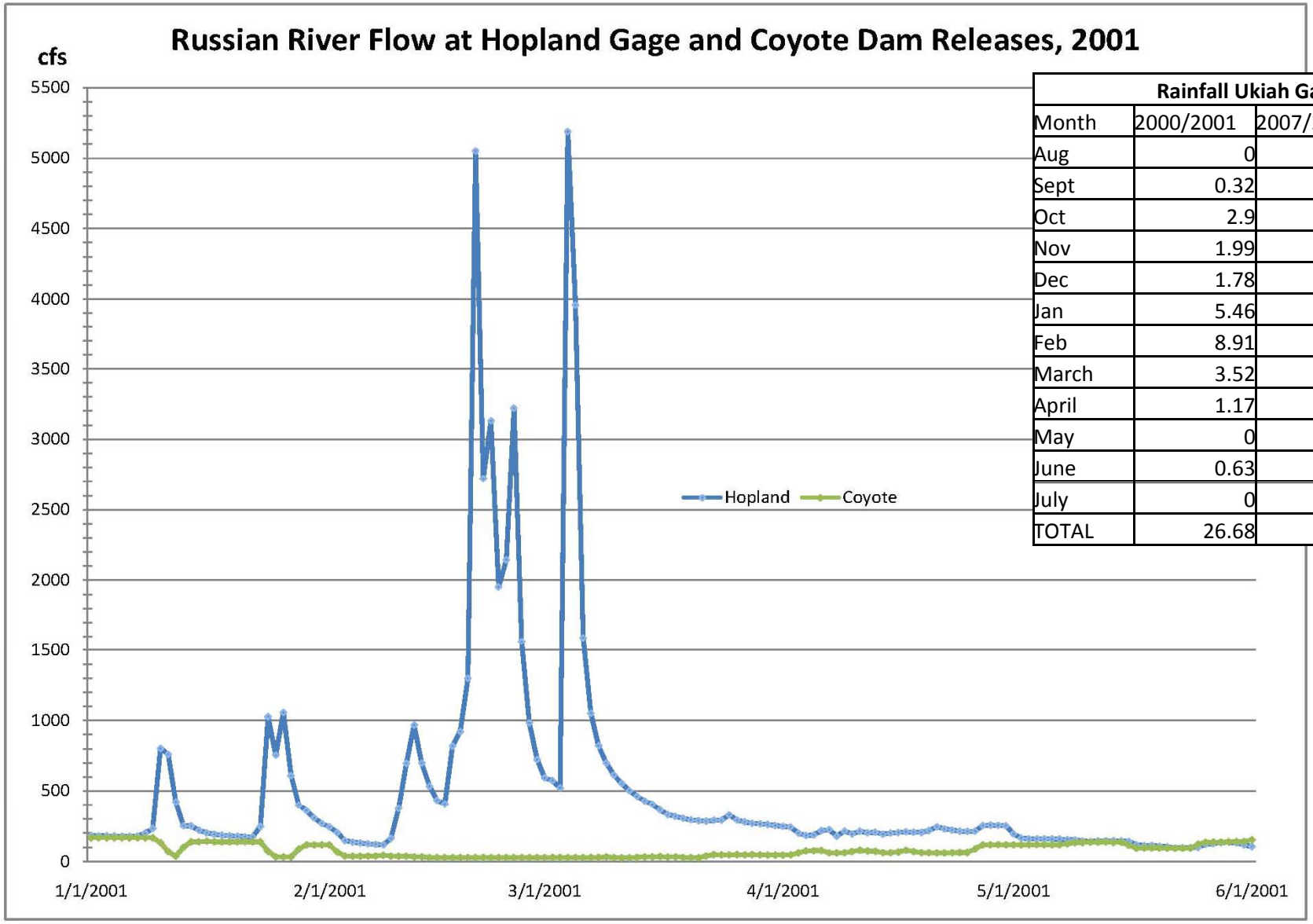
Three monitoring wells/creek were installed at scattered locations along Morrison and Parsons Creeks. Wells were 13 ft deep. No other agricultural wells were operating when readings were made.



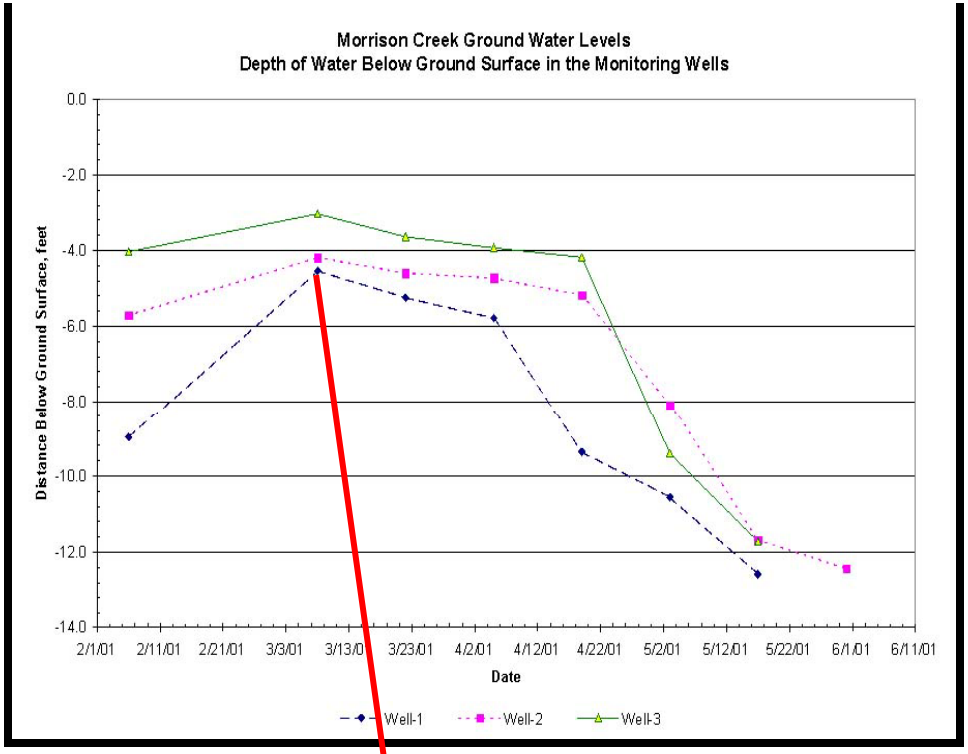
Groundwater dropped up to 9 feet in less than 3 months.

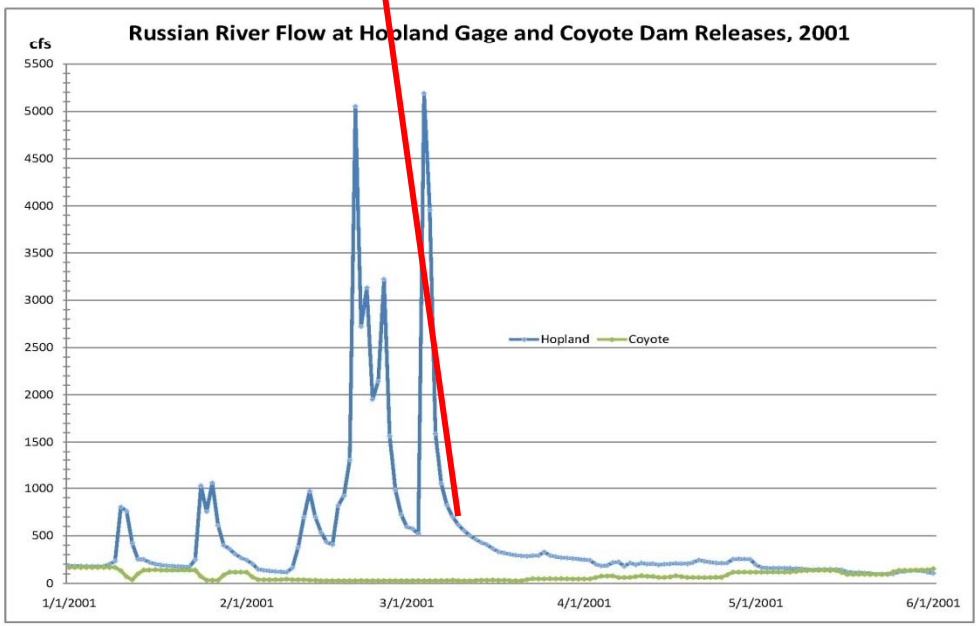


Same pattern in Parsons Creek as Morrison except for the well above the road bridge which is not as affected by river levels



Rainfall Ukiah Gage			
Month	2000/2001	2007/2008	2008/09
Aug	0	0	0
Sept	0.32	0	0.28
Oct	2.9	2.18	1.22
Nov	1.99	0.6	4.53
Dec	1.78	7.3	3.48
Jan	5.46	15.25	0.78
Feb	8.91	5.22	9.26
March	3.52	1.25	2.56
April	1.17	0.44	
May	0	0	
June	0.63	0.01	
July	0	0	
TOTAL	26.68	32.25	22.11

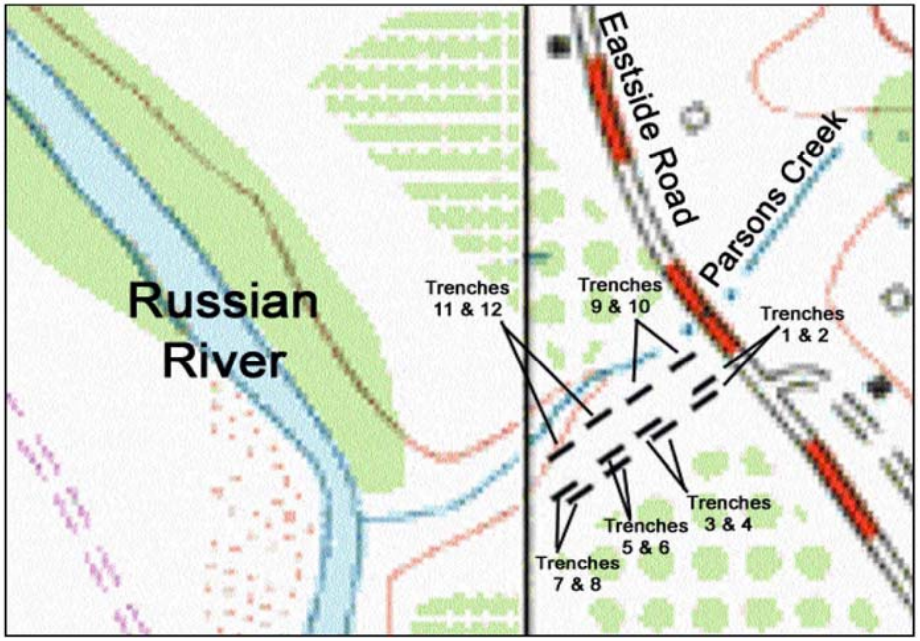




Drop in ground water levels coincides with the drop in flow levels in the main river channel and is the greatest in the well (#1) located closest to the Russian River indicating that the river's water surface elevation is controlling the dewatering of the tributaries.

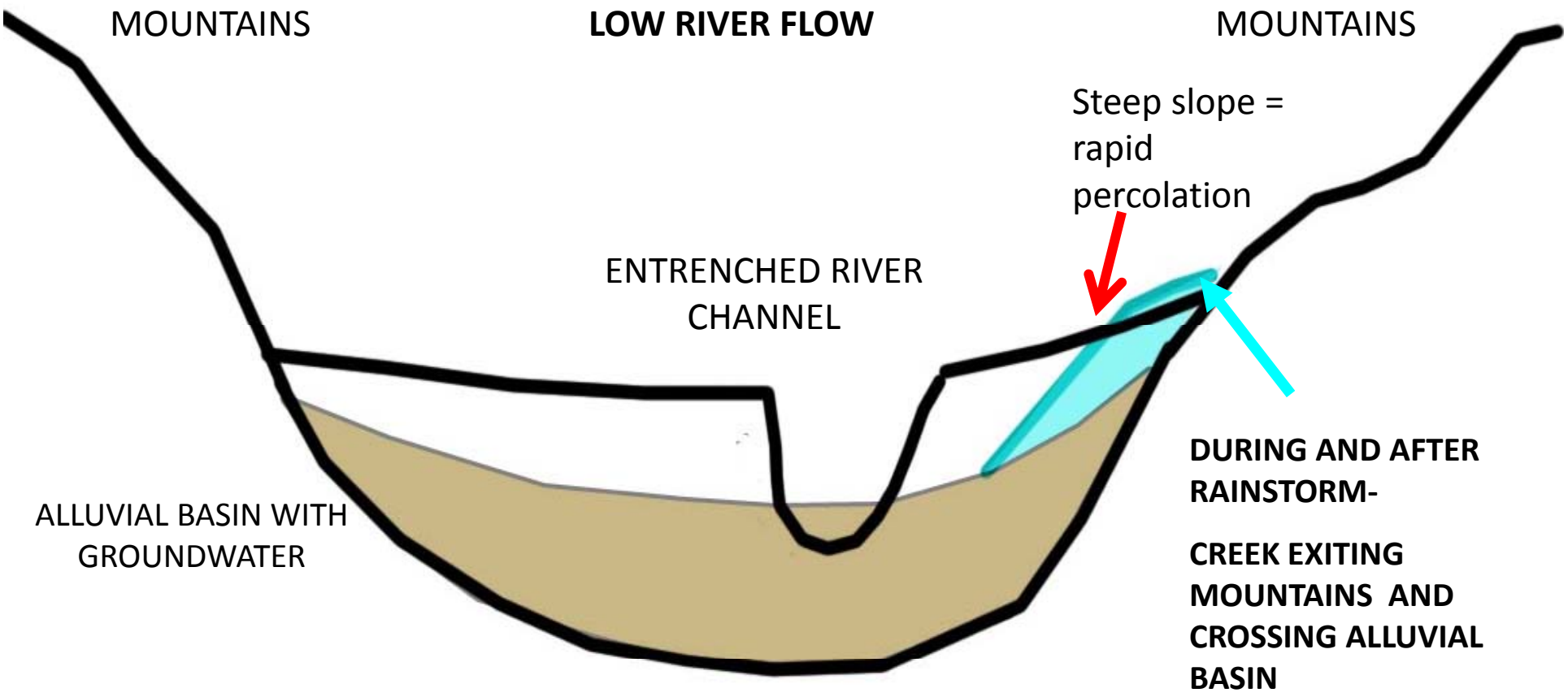
Flow in both Morrison and Parsons Creeks went subterranean as the water level in the river dropped. No juvenile steelhead could have migrated out of these creeks which have year round flow in their canyons.

Dormant willow poles were placed in trenches 4 and 8 feet deep to determine if this technique would establish riparian vegetation on these creeks

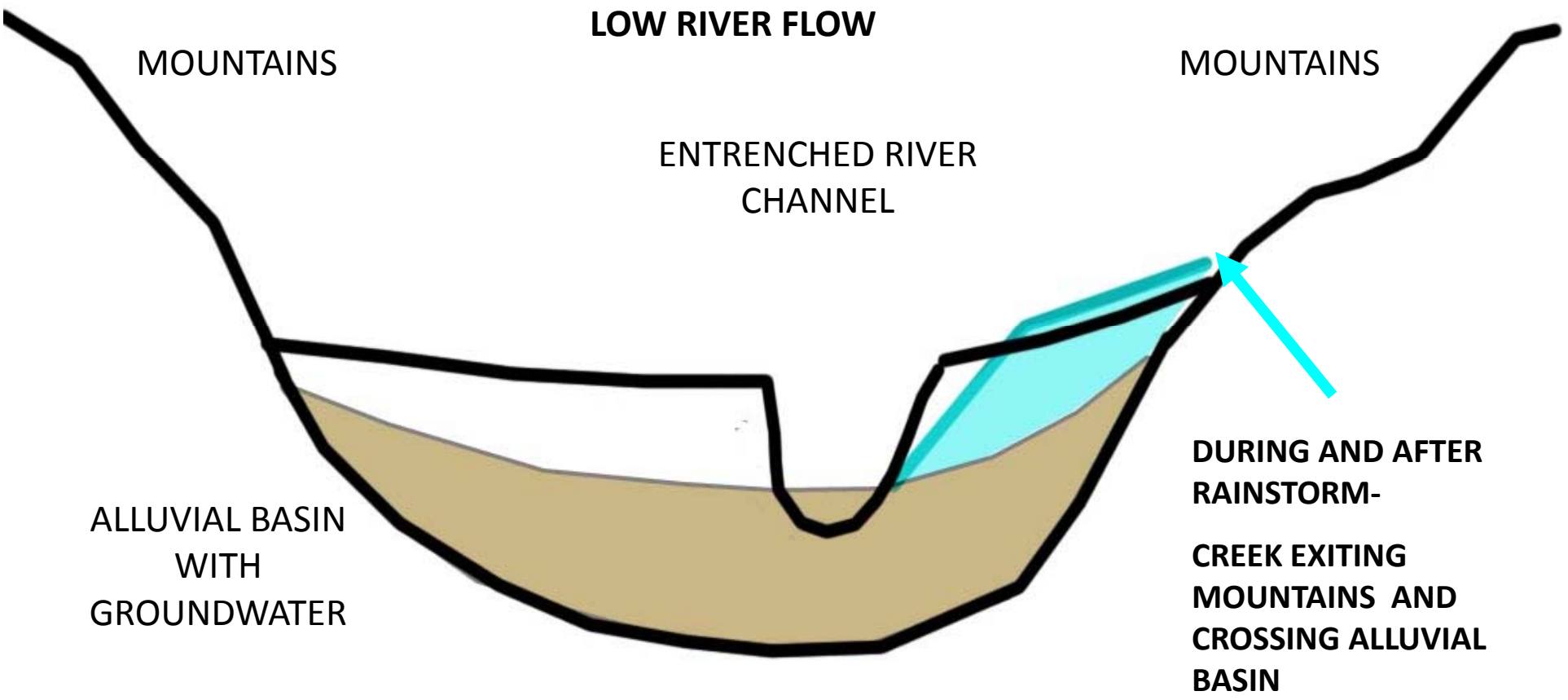


All the willows in all the trenches leafed out indicating there was sufficient groundwater in the Feb-March period

Willows survived in the most upstream trenches whether 8- or 4-foot in depth but <u>all the willows died</u> in the trenches closest to the river. The management of water levels in the main Russian River by releases from Coyote Dam has a significant effect on the function of the aquatic and riparian ecosystem in the Upper Russian River.

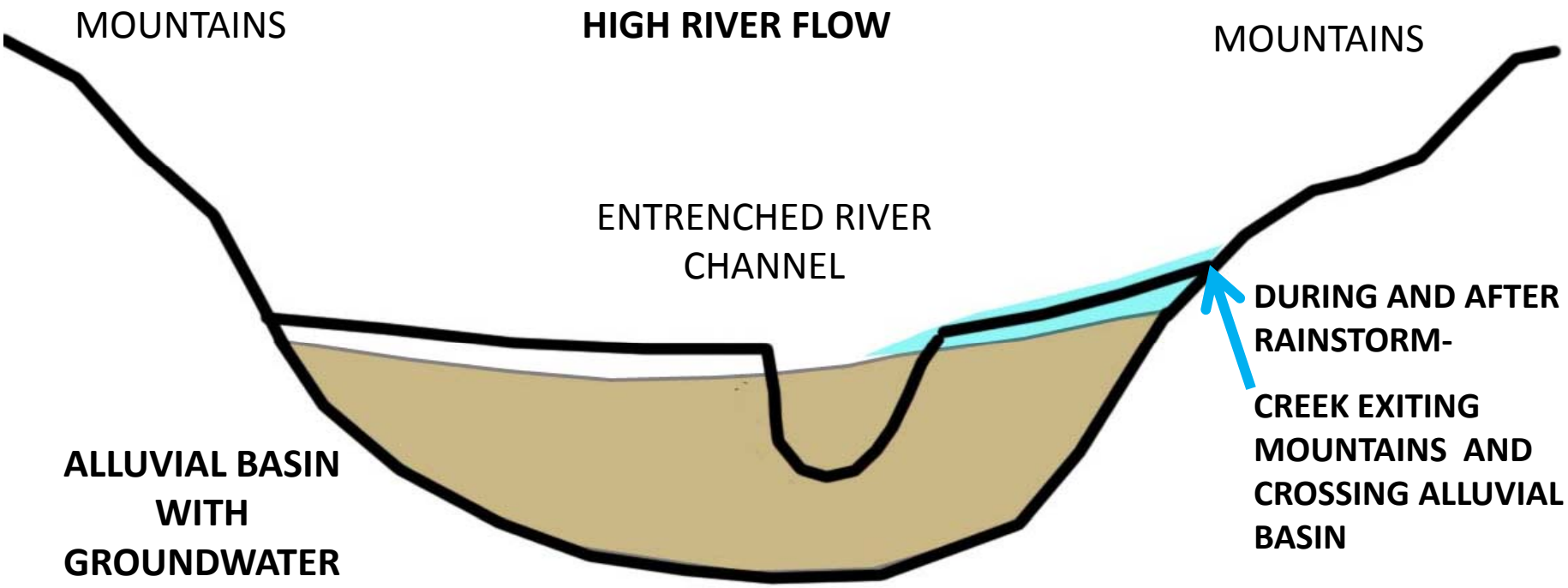


At low flow in the river channel water exiting the creek canyon onto the alluvial valley will percolate into the alluvium until the alluvium is filled with water and the river rises. The slope of the ground water basin between the creek outlet and the river level determines how quickly the water percolates



During large or intense rainfall events when the river is still low creek flow may be great enough to make it nearly to the river channel before percolating into the alluvium

Morrison Creek in 2008/9 percolating into the alluvium near its canyon outlet (above) and near the river. The Russian River is about 1000 ft. downstream from where the water is percolating into the ground in Morrison Creek. Red arrow indicates direction of flow.



MORRISON CREEK AT HIGH FLOW IN FEBRUARY 2009.

Alterations to the Russian River by Coyote Dam include entrenchment of 20 ft in the main river channel and alteration of stream flow by reservoir releases for water supply. These changes have altered groundwater levels in the tributary streams. This experiment demonstrated that the shallow groundwater begins to recede from the river confluence upstream and undergoes a steep decline as the river water levels drop and releases are reduced.

It is very likely that these altered tributaries do not have connected flows for very long in a dry to very dry year. These conditions limit access for steelhead trout to spawning and rearing habitats upstream in the creek canyons.