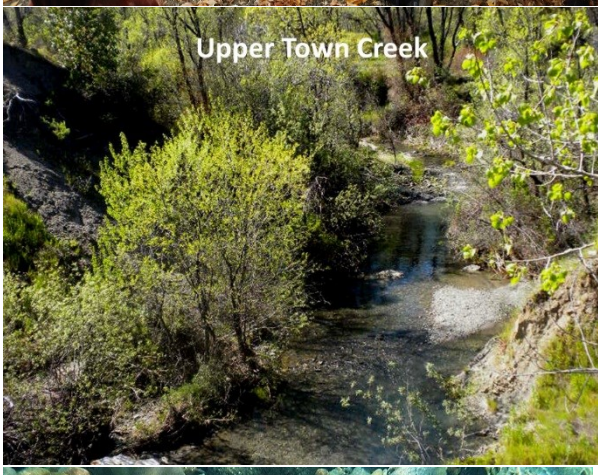
Town Creek: Path to Recovery



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For: Eel River Recovery Project

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Town Creek is a tributary of Grist Creek, that joins Mill Creek that then flows to the Middle Fork Eel River (Figure 1). The proximity of Town Creek to Round Valley Elementary School (RVES) prompted this study, as students and teachers there showed interest in restoring the creek. Although restoration planning was not fully funded under the Mendocino County Fish and Game Commission grant to the Eel River Recovery Project (ERRP), this document is provided for preliminary guidance on Town Creek watershed restoration and specifically for the reach nearest the school.

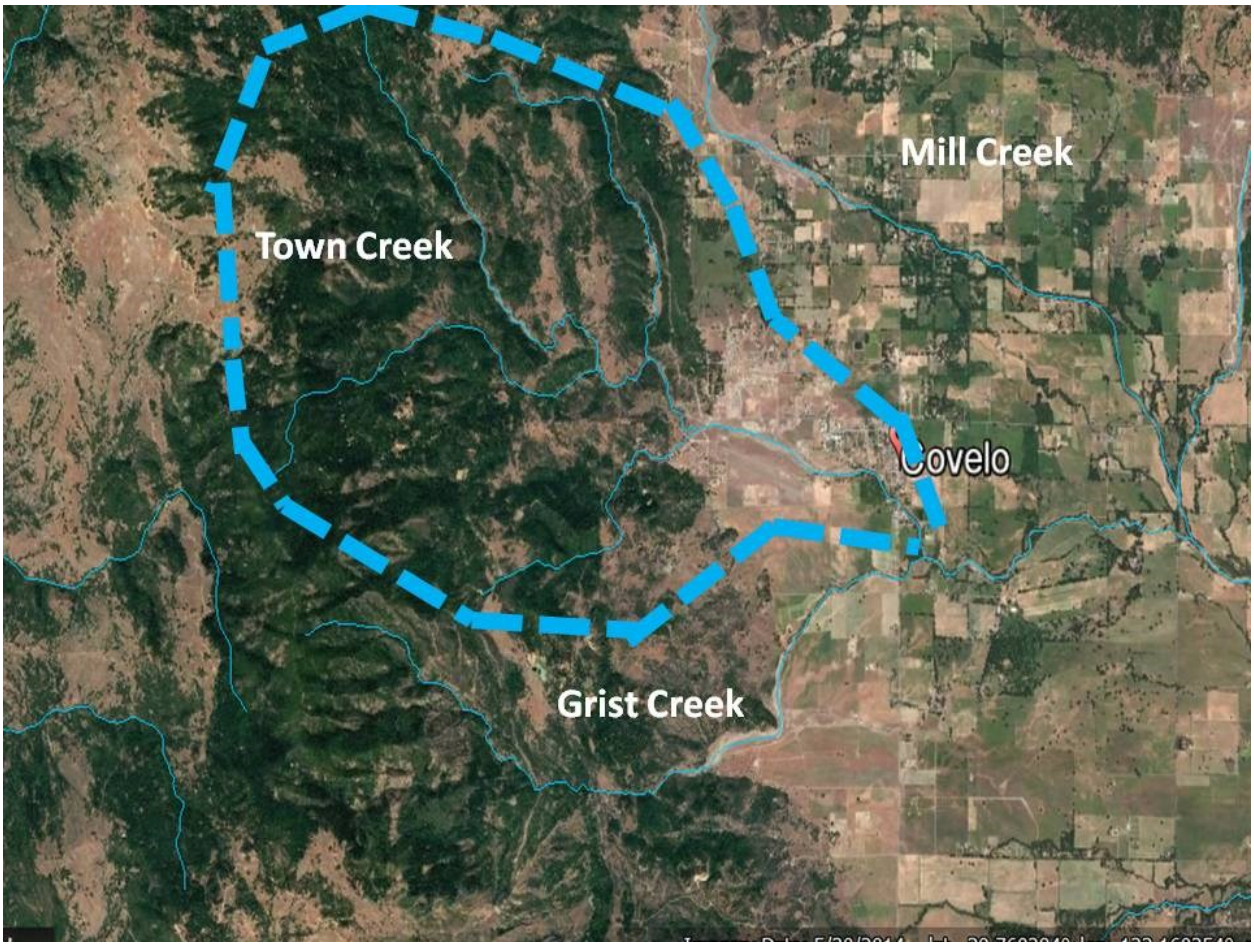

Figure 1. Town Creek watershed, boundary in dashed blue line. Image from Google Earth.

Aquatic Habitat and Fishes

Town Creek only flows seasonally on the valley floor near Covelo, although this may not have been its historic condition. Today surface flows resume with rains in fall, but by late May to mid-June the creek loses surface flow (Figure 2). This is highly undesirable since the stream was likely historically perennial and loss of summer surface flow greatly diminishes aquatic productivity including production of juvenile salmonids. Town Creek likely maintains perennial surface flow in headwater areas (Figure 3) but slips beneath the surface as it hits the valley floor.

Figure 2. Town Creek with no riparian on valley floor.

Figure 3. Town Creek upper reaches.

Winter steelhead ascend the Middle Fork and Town Creek routinely, but Chinook salmon spawning may also occur in its lower reaches in high flow years. Steelhead (Figure 3) return to Town Creek from January through April as flows allow. Resident rainbow trout may also occur in upper Town Creek, and steelhead and resident trout are similar genetically and both may exhibit sea-run behavior if they migrate or are washed to the ocean. Juvenile steelhead may rear in headwater areas, but must otherwise migrate downstream to the Middle Fork to survive as Town, Grist and Mill creeks all dry up in summer.

Pacific lamprey (Figure 4) also use Town Creek to spawn, and redds were apparent in May 2016 in the reach near RVES. Most were high and dry when visited at that time, but there was a live adult lamprey in an isolated pool.

Figure 3. Adult winter steelhead.

Figure 4. Adult Pacific lamprey.

While upper Town Creek has a well defined stream course and riparian vegetation, when the creek emerges onto the Round Valley floor it loses all definition and has no riparian. This condition may be related to past flood events. As Town Creek flows through Covelo, its course narrows and it has riparian vegetation that is of high quality in some reaches.

Town Creek has a long history of bank stabilization using car bodies (Figure 5) and truck tires (Figure 6). According to local residents, this was a technique used through the middle 1980's and was actually subsidized as a method of erosion control. The tires and cars leak low levels of toxics into the environment. Car bodies can produce jagged edges and present a hazard to people and migrating fish.

Figure 5. Car bodies used for stabilization embedded in bank.

Figure 6. Cabled truck tires used to prevent Town Creek bank erosion.

Town Creek, like many creeks in Round Valley, is used as a transportation corridor in summer and the resulting use by quad runners flattens the stream habitat and prevents recovery. One resident documented removal of large spanning cottonwood tree that would have dramatically improved Town Creek habitat, but those using the creek as a road cut out the tree even though it was on private property.

The reach of Town Creek of greatest interest with regard to restoration is just downstream of Airport Road, which is the study reach used by RVES teachers and ERRP. While the riparian conditions improve at this location, the stream flow skews to the north just downstream of the Airport Road bridge and is creating a substantial bank erosion problem (Figure 7).

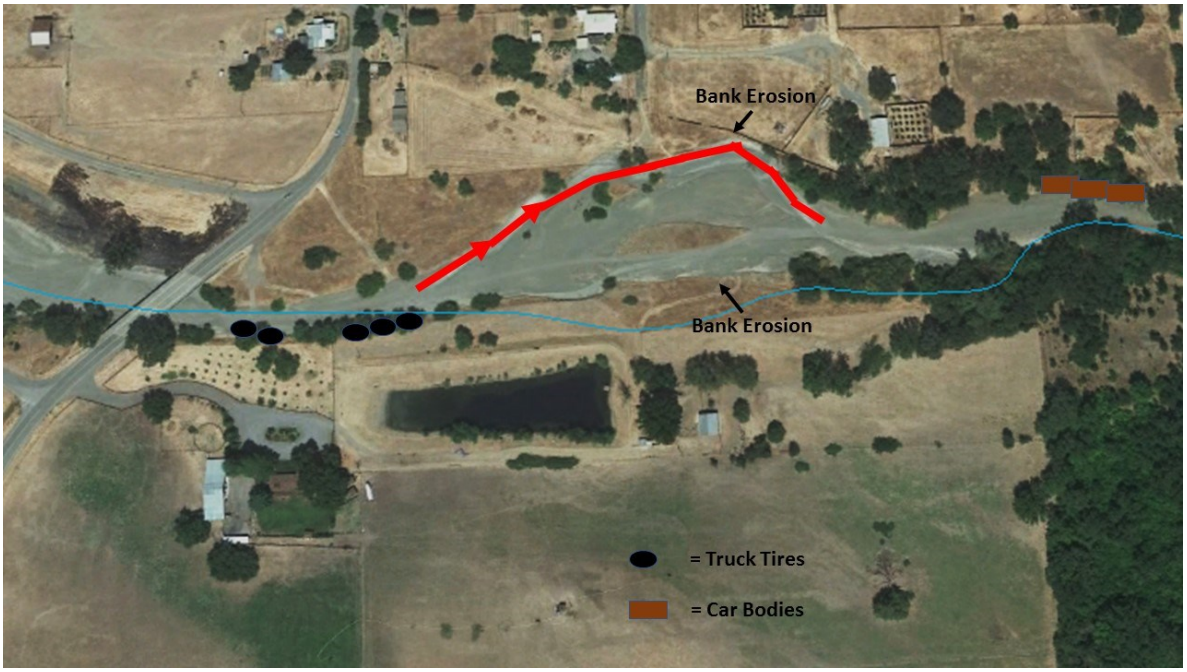

Figure 7. Town Creek reach below Airport Road with current channel (red line), areas of eroding banks, and locations of car bodies and truck tire bank stabilization.

Watershed Conditions

Town Creek's headwaters are on Poonkinny Ridge and it has four predominant underlying types of bedrock: mélange in its headwaters, blue schist in much of the middle portion of the basin, greenstone along its border with Grist Creek to the south, and alluvium on the valley floor (Figure 8). Both mélange and blue schist are highly erodible, which likely contributed to excess sediment yield that is a partial cause for the loss of aquatic habitat. Also, recent studies by UC Berkeley indicate that mélange terrain in the Central Franciscan Terrain stores less groundwater than fractured sandstones further west in the Eel River basin.

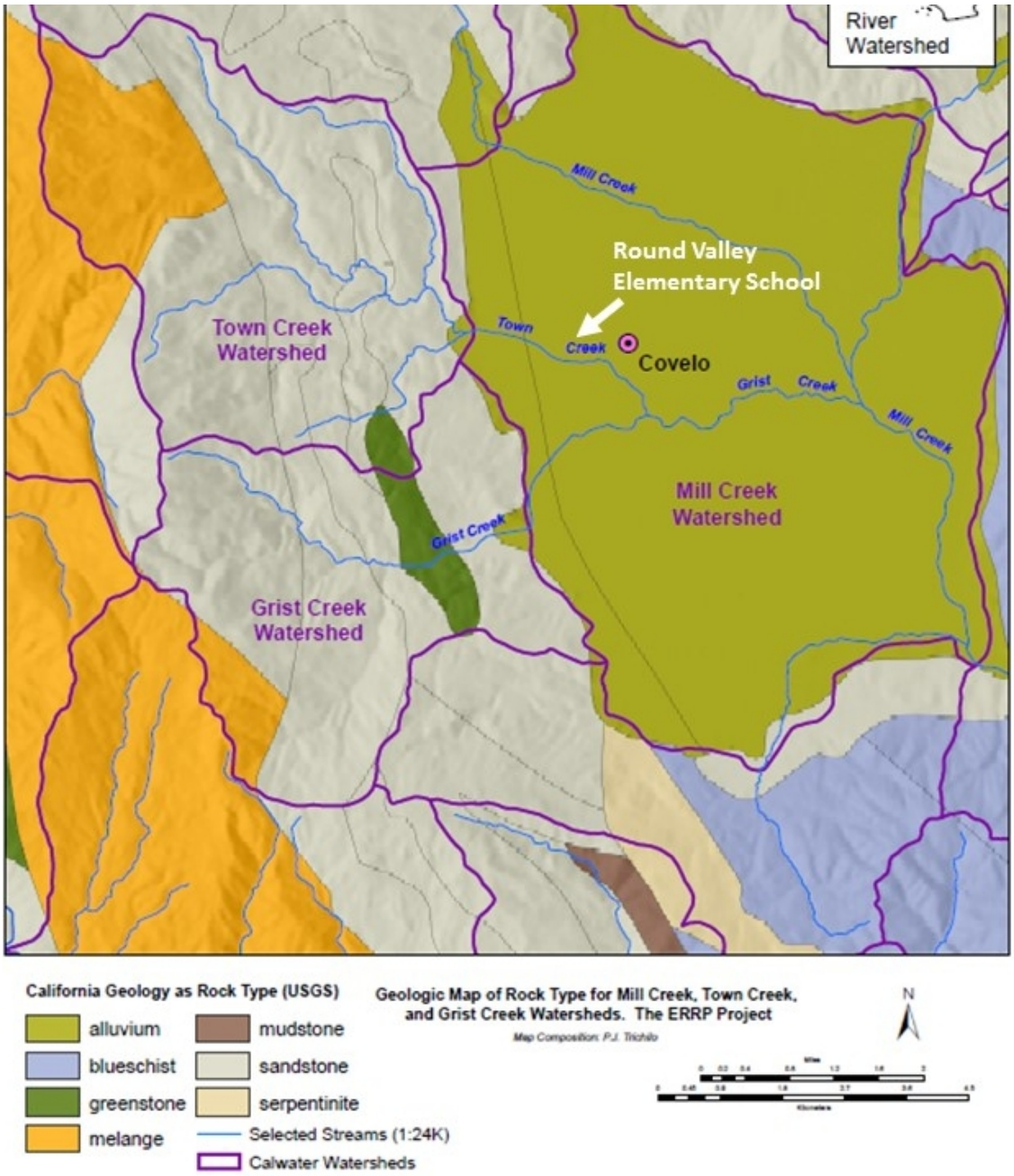

Figure 8. Bedrock geology of the Town Creek watershed.

The headwaters are steep and the topography of the basin causes more rain fall there as a result of the orographic effect (Figure 9), where cold temperatures over peaks cause on increase in rainfall as winter storms pass over. While rainfall is about 40-44 inches per year on the Round Valley floor, rainfall may be as much as 56-60 inches in Town Creek headwaters.

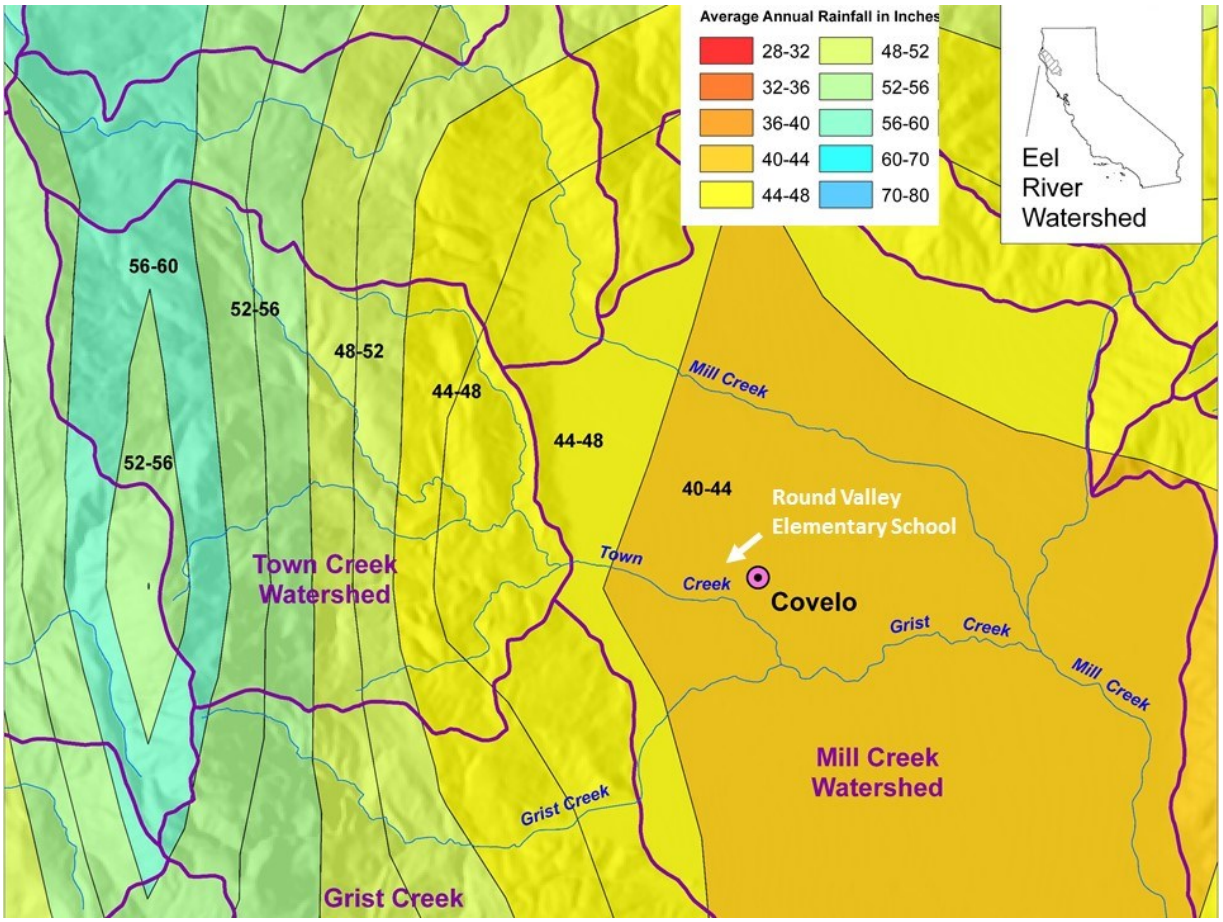

Figure 9. Town Creek watershed and rainfall patterns driven by elevation.

Patterns of vegetation prior to European contact are likely different than today. Coniferous forests are interspersed with oak woodlands, and open grasslands also occur in the watershed. Vegetation changes have likely occurred due to cessation of Native American controlled burning, logging and road building, rural residential development and most recently increased cannabis cultivation. Oak woodlands in the area have been compromised as a result of Douglas fir and pine incursion, which increases evapotranspiration and decreases groundwater storage and stream base flow. Similarly, young conifers that are mostly sap wood utilize 3.5 times more water than old growth trees. Logging of old growth caused a conversion to young forests that are much more highly consumptive of water. Therefore, changes in vegetation are likely linked to changed in Town Creek's flow regime. Confirmation of the above assumptions was beyond the scope of this project; however, maps from the California Department of Forestry (Figure 10) indicate that timber harvest in Town Creek continues and is extensive.

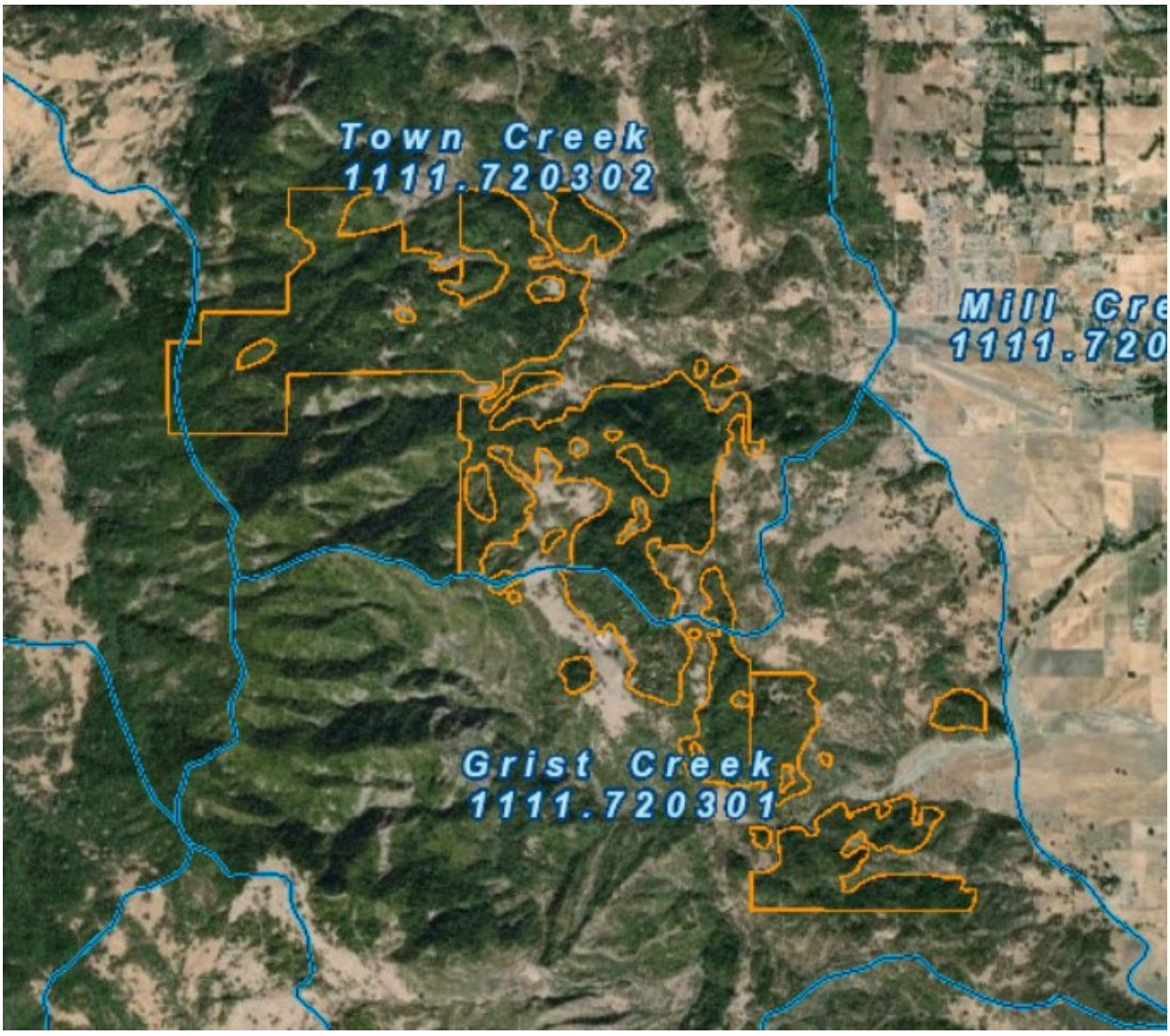

Figure 10. Town Creek watershed timber harvest map. Source CDF website.

There was a water storage reservoir on Town Creek just upstream of where it empties out onto the valley floor. Excess sediment resulting from upland disturbance filled this impoundment and the dam failed in the early 1970s. The sediment release and wall of water that resulted may have contributed to channel changes, wiping out riparian vegetation. Also, sediment over-supply tends to destabilize stream channels and throw them into uncontrolled oscillation.

Hydrology of Mill Creek and its tributaries like Town Creek have been profoundly altered from historic conditions as channels were ditched and diked to increase the amount of land available for development. Also, ground water withdrawal may play a role in loss of stream surface flow and the loss of riparian forests.

Restoration Options

Restoring flow to Town Creek may be possible by reducing upland erosion and restoring watershed hydrology and fluvial morphology of the stream bed, with the latter being accomplished in part by restoring riparian zones. These remedies are daunting in scale and need much more analysis before any specific plans are advanced or remedial measures implemented. Improvement of the reach below Airport Road is desirable regardless of whether perennial flow can be restored, and the recommendations for that reach could go forward for detailed planning and implementation separately.

Restoring Flow: The history of change in vegetation and hydrology need further exploration to confirm the assumptions stated above. The following recommendations are general in nature and more study would be required to confirm their applicability.

1. Reduce road densities in the Town Creek watershed and relocate road segments on steep slopes or that cross springs, in order to increase groundwater storage and reduce sediment yield,
2. Restore oak woodlands by removing invasive, small diameter conifers and promote seasonal controlled burns to maintain them,
3. Cease removal of larger diameter, older conifers and instead promote timber harvest that takes small diameter understory conifers (thinning from below), and
4. Promote water conservation on rural residential parcels and cannabis farms in the Town Creek watershed.

Riparian Restoration: Bioengineering is a restoration technique that utilizes strategic amounts of large rock and boulders and large amounts of living willow material. Rock structures are interwoven with layers of willow and aggregate. The technique is most successful when willows can be watered immediately upon placement until their roots are established. Unlike use of large rock only, bioengineering structures dampen currents instead of accelerating them, which can cause bank failures immediately downstream. The willow material also tends to trap suspended soil particles in stream flow that can help rebuild stream banks and terraces. In the longer term, restoring the riparian zone adjacent to the airport would be desirable, but much more study would be needed before any activity could be proposed.

This report recommends that planning begin immediately to restore the reach of Town Creek immediately downstream of Airport Road. Figure 11 shows where bioengineered structures should be used to replace cabled truck tires and car bodies in this reach. However, channel excavation should be undertaken to direct the flow off the north bank where a 10 foot high cut-bank has developed. If such action is not taken, bank erosion at this location will increase and ultimately could threaten residential parcels nearby. After recontouring the channel, willow baffles would be installed to stabilize the gravel bar and to trap new sediment that would help continue to build a point bar. One isolated reach of the south bank is also eroding, and it would need treatment with rock and willow structures.

Figure 11. Recommended treatment for Town Creek channel downstream of Airport Road bridge.