3. PROJECT SETTINGS AND WATERSHED HISTORY

3.1 PHYSICAL SETTING OF THE NAPA RIVER PROJECT REACH

The physical setting of the project reach is described in the recent ‘Napa River Basin Limiting Factors Analysis’ (Stillwater Sciences, 2002) and a brief synthesis only is included in this report. The Rutherford reach of the Napa River is approximately four miles long and lies 20 miles upstream of the mouth of the river, between Zinfandel Lane Bridge and a point upstream of Oakville Cross Road Bridge (Figure 1). The watershed area at the Zinfandel Lane Bridge US Geological Survey stream gage (11456000) is 81.4 square miles, composed of a mixture of urban areas (the towns of Calistoga and St Helena), arable valley bottom land (primarily vineyards) and forested upland areas. The underlying geological setting is a Pleistocene structural and topographic trough in the Californian Coastal Range province associated with the San Andreas Fault (Stillwater Sciences, 2002). The floor of the Napa Valley is composed of alluvial fan and valley fill deposits that were washed down from the adjacent mountain fronts on the east and west valley sides. These sediments were deposited in a mixture of environments ranging from active alluvial fans to lakes, and have a corresponding range in particle sizes from gravels to fine silts. The fine-grained valley fill in particular forms the valley bottom soils in which the Napa River has developed its channel.

The area’s climate is Mediterranean, characterized by mild wet winters and warm summer droughts. Average rainfall in St Helena is 35 inches per year (Stillwater Sciences, 2002), falling mostly between November and April. During summer the river typically has flows of approximately 10 cubic feet per second (cfs). During winter peak conditions flows rapidly rise following rainfall. Stillwater Sciences (2002) analyzed USGS instantaneous flow records for the St Helena gage between 1929 and 1996 to calculate flow discharges (cfs) for the following return intervals: 1.5 years – 4,225 cfs, 2 years – 6,007 cfs, 5 years – 10,157 cfs, 10 years – 12,450 cfs, 50 years – 16,155 cfs and 100 years 17,271 cfs.

3.2 HISTORY OF THE NAPA RIVER AND CONTEXT OF CURRENT CHANNEL CONDITIONS

The Napa Valley was taken into agricultural production by the 1840s, primarily grazing and arable on the valley bottom. Until the 1960s the main valley floor land uses were orchards, vineyards, field crops and small-scale urbanization (Stillwater Sciences, 2002). Since this time grape production has rapidly increased, and is currently the dominant landuse in the project reach and surrounding valley bottom. The Napa River and its riparian corridor has been modified in numerous ways due to land use. Aerial photos from the 1940s show the mainstem Napa River as a low gradient gravel bedded stream with complex bar and pool morphology including mid channel and point bars, multi-thread channels and wetland sections (Stillwater Sciences, 2002). The river was not entrenched as it is presently, but was well connected to its floodplain and flooded annually. At the present time the river in the project reach is almost entirely a single thread channel, and is deeply entrenched in a narrow, confined cross section. The channel is very disconnected from its former floodplain, a situation that has been made more pronounced by the construction of flood levees on the upper reach (from Rutherford Road north).

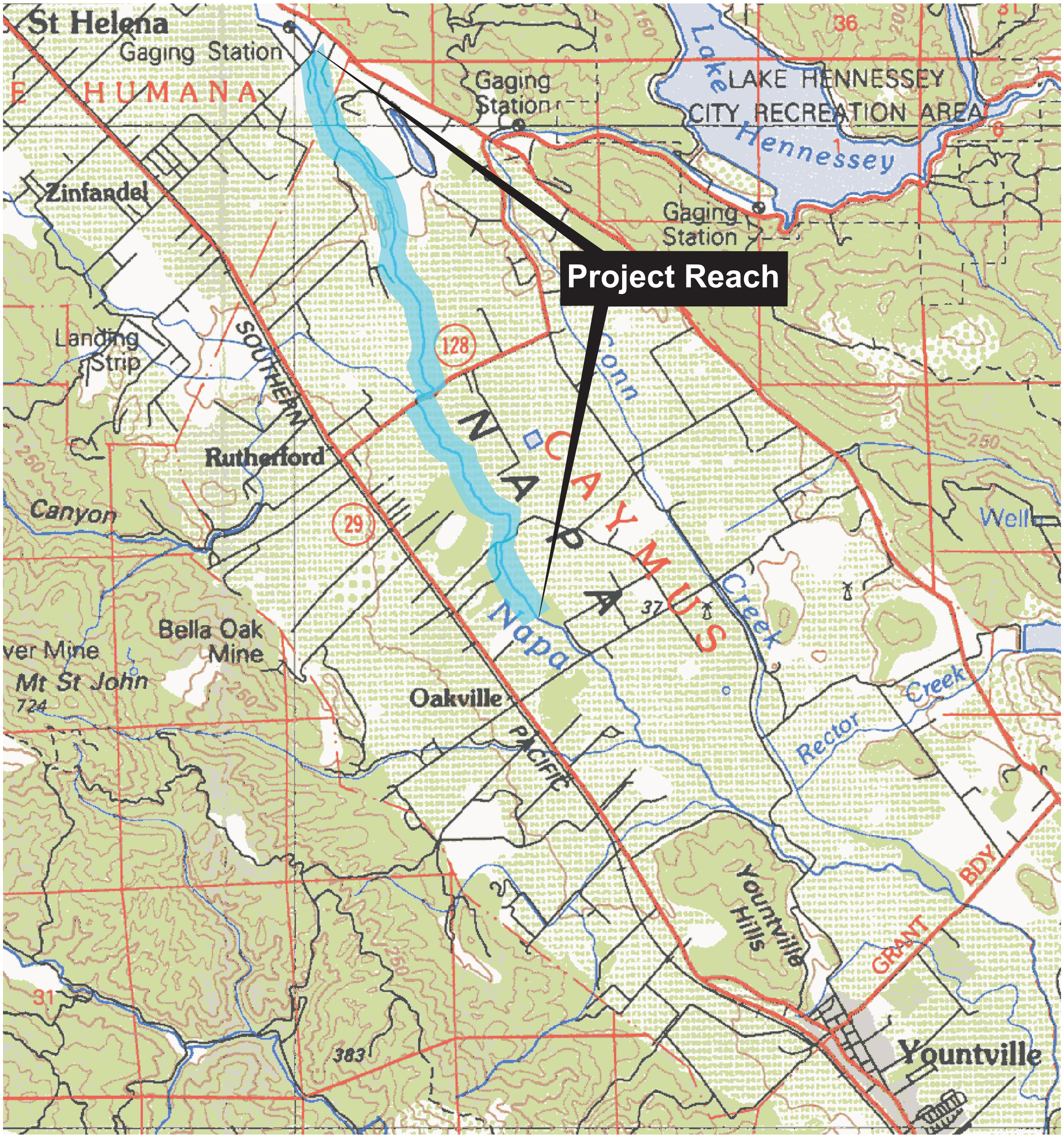

figure 1

Napa River Rutherford Restoration

Location Map

Project # 1638-02 LocMapcdr

PWA

The Napa River channel and riparian corridor have undergone extensive modification since the 1840s, including channel straightening, point bar skimming and vegetation removal, loss of riparian woodland, levee construction, bank stabilization and gravel extraction. In addition to changes in the project reach there have been changes in surrounding reaches that have led to migrating areas of channel instability. For example, channel dredging downstream may have created knickpoints that migrated upstream into the project reach. These activities, and changes to the tributaries and watershed, have resulted in an incised channel that is deeper, narrower, straighter and less complex compared to its original condition.

As well as the mainstem, the floodplain drainage has been extensively modified, with tributary channels and former ‘back channels’ straightened and in some cases eradicated. New drainage has been added in the form of drainage ditches. Some of these modified areas also have great potential for modification to restore habitat and potentially improve flood drainage.