Table 2. Some of the relationships between common limiting factors, land uses, and management actions to restore fish: Napa River-Sonoma Creek Example.

Limiting Factor	**Typical Cause(s)**	**Primary Sources**	**Management Actions by Source Category**
Fine sediment accumulation in Channels	Accelerated upslope and/or stream channel erosion	Land uses in and adjacent to streams, and other sensitive features, such as steep slopes. Primary sources may include: vineyards and ranches, roads, and rural residential and commercial development.	<u>Vineyards and Ranches</u> • Encourage establishment of stream setbacks • Enhance native woody vegetation in riparian corridor • Emphasize biotechnical bank stabilization • Establish performance standards for road erosion-control (road surface, road surface drainage, stream crossings, and road maintenance practices) • Provide grant funding and regulatory incentives to encourage participation in holistic management programs, such as Napa Green Certification. <u>Roads</u> • Establish performance standards for public roadways (as listed above) • Adopt standards into municipal stormwater permits. • For large private roads, consider inclusion into municipal stormwater permit, general WDRs, and/or waivers • Provide grant funding for road erosion control**,** and prevention projects <u>Existing Development</u> • Provide incentives for voluntary enhancement of riparian vegetation and biotechnical bank stabilization • Facilitate implementation of management plans developed by local watershed councils • Prioritize grant funding for reach-to-tributary scale projects <u>Future Development</u> • Facilitate adoption of effective local stream-setback and erosion-control ordinances that apply to all land use categories.

Table 2. Some of the relationships between common limiting factors, land uses, and management actions to restore fish: Napa River-Sonoma Creek Example.

Limiting Factor	**Causes**	**Primary Sources**	**Management Actions by Source Category**
Stressful water temperatures	Tree removal Reduction in baseflow Fine sediment filling pools Increases in channel width	Same sources as for fine sediment plus municipal water supply and wastewater treatment (Municipal Water Management)	As described for fine sediment <u>Municipal Water Management</u> • Facilitate development of additional recycled water to directly or indirectly enhance dry season flows for steelhead and salmon • Provide incentives to local government to emphasize this objective in developing additional recycled water
Lack of habitat complexity	Altered delivery of water, sediment, and wood to channels. Direct physical alteration of channel bed, banks, or vegetation.	Same sources as for fine sediment and temperature plus artificial levees, and channel maintenance activities. Primary mechanisms may include: removal of large wood from channels by Public Works Agencies and rural residential landowners and managers, small and large dams built in channels, and development within riparian corridor.	<u>Channel and Road Maintenance</u> • Develop performance standards for management by local governments of large wood and stream vegetation • Adopt standards into municipal stormwater permits <u>Existing Development</u> • Provide funding for local watershed councils to conduct surveys to quantify large wood loading and functions, and identify opportunities and constraints and pilot projects for adding large wood to streams. • Work with local stewardships to facilitate voluntary enhancement of native riparian vegetation. <u>Future Development</u> As described above <u>Dams</u> • Work with watershed councils to conduct comprehensive surveys of barriers, aquatic habitat, and instream flow. • Provide grant funding to replace or retrofit dams with off-stream reservoirs, and/or to provide alternative water supplies (recycled water)

Table 2. Some of the relationships between common limiting factors, land uses, and management actions to restore fish: Napa River-Sonoma Creek Example.

Limiting Factor	**Causes**	**Primary Sources**	**Management Actions by Source Category**
Low baseflow	Consumptive water uses, and/or land cover changes that intensify peak flow.	Agricultural, rural residential, and urban development.	<u>Vineyards and Ranches</u> • As above for dams plus real-time streamflow gages, and/or other tools to increase water use efficiency or enhance irrigation timing <u>Municipal Water Management</u> As described above. <u>Future development</u> • Facilitate environmental policies by local government to prevent significant increases in peak flow • Work with SWRCB Water Rights Division to improve monitoring of ambient conditions and compliance with permit conditions
Migration barriers		Road crossings, on-stream dams and diversions.	• Sign-on to CA Resources Agency Fish Passage MOU • Make identifying and correcting fish passage problems a priority for grant funding by Regional Board • Work with local watershed councils to evaluate and resolve problems • Require local public agencies to complete comprehensive surveys of road crossings to identify potential migration barriers