Table 4.1. Specific Impacts, Stressors, and Specific Management Goals

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
LAND USE		***Removal of Riparian Vegetation Due to Development***	Throughout the watershed	***Preservation and Restoration of Riparian Habitat***
	FM, R-FHM, WRM, OSP	❑ Increase bank erosion		❑ Preserve and revegetate riparian areas with native species
	FM, R-FHM, WRM, OSP	❑ Shade reduction		❑ Establish buffer zones for no development or removal of riparian vegetation
	FM	❑ Fish food source impacts; reduction in cover and food		❑ Eradicate invasive, non-native species
	FM, R-FHM, OSP, PEI	❑ Community/species diversity o Non-native invasive species o Change in local ecological community dynamics – change in dynamics of other non-native species competition with/predation of native species – shifting communities		❑ Develop guidance for planners, developers, and permitting agencies regarding bank erosion, removal of riparian vegetation, and use of invasive non-native species
	R-FHM, OSP	❑ Non-contiguous habitat		❑ Maintain public lands/preserves as public/preserves; maintain easements and lease control
	FM, R-FHM, WRM	❑ Reduced filtration of pollutants and sediment		❑ Preservation and management of Open Spaces
	FM, R-FHM, OSP	❑ Overall reduction in habitat area		❑ Allow floodplain flooding to occur
	FM, R-FHM, OSP	❑ Increased edge effect		❑ Restore floodplain area and habitat
	FM, R-FHM, WRM	❑ Increase in local ground water table/soil moisture (less plant uptake)		❑ Cattle fencing/crossings to minimize bank trampling
	WRM, OSP, PEI	***Removal of Upland Native Vegetation Due to Development***		❑ Signage and public education to minimize horse and OVR channel destruction
	FM, WRM, OSP	❑ Increased surface erosion -> stream sedimentation		***Mapping (GIS)***
	OSP, PEI	❑ Community/species diversity o Invasive non-native species o Change in local ecological community dynamics – change in dynamics of other non-native species competition with/predation of native species – shifting communities		❑ Create a current digital land use cover with attributes
	OSP	❑ Non-contiguous habitat		❑ Create a current digital cover of all plan areas and zoning/planned land use
	FM, WRM, OSP	❑ Reduced filtration of pollutants and sediment		❑ Map canal system, ponds, reservoirs, siphons, aqueducts, channel elevation, and which are still in use
				❑ Digital map of impacted areas and extent: removed vegetation and

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
	PEI FM, R-FHM, WRM, OSP, PEI FM, R-FHM, WRM, DG FM, R-FHM, WRM FM, R-FHM, WRM FM, R-FHM, WRM FM, R-FHM, WRM FM, R-FHM, WRM FM, R-FHM, WRM WRM, DG	***Development in the Floodplain*** ❑ Reduction in floodplain area and habitat ❑ Channelization and levees for flood control -> channel morphology changes ***Increased Impervious Surfaces (amount and connectivity) Due to Development*** ❑ Change in flow regime ❑ Higher peak flow ❑ Faster timing of peak flow ❑ More flow volume ❑ More surface runoff ❑ Change in sedimentation and sediment transport o Increased surface erosion o Increased bank erosion o Increased scour of streambed ❑ Reduction in localized flooding of developed area (street and sewer conveyance off-site)	Secret Ravine, Miners Ravine	eroded areas ❑ Locate all outfalls digitally ***In-Stream Management and Restoration*** ❑ Allow floodplain flooding to occur ❑ Restore floodplain area ***Studies*** ❑ Determine which streams have changed from ephemeral to perennial ❑ Assess outfalls for flow during storm events and or irrigation ❑ Measure water quality of WWTPs for nutrients ❑ Determine impact of urban v. rural uses on water quality ❑ Sediment studies to determine extent of sediment toxicity problem ❑ Determine canal management practices (flows, timing, control) ❑ Gage streams to determine actual flow and flow pattern
	PEI FM, R-FHM, WRM FM, R-FHM, WRM FM, WRM, DG FM, WRM	***Nuisance and Augmented Flow (ephemeral changed to perennial; intermittent flow during dry season) Due to Development*** ❑ Canal management ❑ Irrigation drainage (landscaped, agriculture) ***Agricultural Land Converted to Residential/Urban*** ❑ Change in wastewater nature, amount, and location of outfall ❑ Irrigation runoff and drainage from agriculture irrigation and runoff from urban	Strap Ravine? Downstream WWTPs, Downstream outfalls	***Preservation and Restoration of Upland Habitat*** ❑ Encourage revegetation with native species ❑ Eradicate invasive, non-native species ❑ Develop guidance for planners, developers, and permitting agencies regarding erosion and stormwater control and use of invasive non-native species. ❑ Buy up easements and replant with native species

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
	FM, WRM FM, WRM, DG FM, WRM FM, WRM FM, WRM, R-FHM, DG FM, WRM, R-FHM, PEI FM, WRM, R-FHM, DG, PEI FM, WRM FM, WRM	❑ Change in amount of surface flow ❑ Change in quality/pollutants ***Placer Mining (historic land use change)*** ❑ Sedimentation (deposited tailings) ❑ Water quality (deposited tailings) ❑ Channel morphology modifications ***Bank Erosion*** ❑ Agriculture o Grazing on bank o Trampling stream banks – unsupported crossings ❑ Recreation o Off road vehicle crossings o Horse crossings ***Upland Topography And Water Storage Modifications*** ❑ Infilling of low areas (including wetlands) ❑ Changes in slope		***Other*** ❑ Public education regarding irrigation and drainage management ❑ On-site detention: development does not change flow regime
WATER QUALITY	 FM, WRM FM, WRM FM, WRM FM, WRM	***Waste Water Treatment Plant Impacts*** ❑ High conductivity ❑ High nutrients? ❑ Temperature effects ***Temperature Impaired*** ❑ Summer impairment (too high for salmonids) ❑ Winter impairment ❑ Year round impairment ❑ Other areas, times?	 Lower Dry Creek Lower Dry Creek Lower Dry Creek, winter Generally all major tributaries except lower Secret Ravine Lower Dry Creek (below WWTP) Miners Ravine	***Management Practices*** ❑ Minimize discharge of surface runoff and associated pollutants ❑ Prevent further degradation through requiring effective water quality BMPs on future development ❑ Implement Integrated Pest Management Programs throughout the watershed ***Studies*** ❑ Evaluate Roseville WWTP discharge for nutrient loads and impact on Dry Creek ❑ Institute a long term monitoring study to determine trends and

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
	FM, WRM	***Turbidity Impairment – can clog fish gills and affect escape predation due to visibility***		potential impacts of land use on water quality (include flow discharge measurements) ❑ Institute first flush monitoring at several locations (first ones missed the actual first flush) ❑ Analyze current and new data for trends (statistics) ❑ Continue BMI studies as improvements are implemented for overall trends assessment (also select appropriate reference site) ❑ Evaluate extent of sediment toxicity ***Mapping (GIS):*** ❑ Map all water quality/quantity monitoring sites ***Restoration:*** ❑ Assess areas for implementation of aeration mechanisms to enhance DO. ❑ Restore shaded riparian habitat to lower stream temperatures ❑ Others as necessary, depending upon studies ❑ Establish riparian buffers to filter surface runoff prior to entry into streams
		❑ Winter	All	
		❑ Yearly	Upper Antelope, lower Secret Ravine, Linda Creek, lower Dry Creek	
		❑ Other areas, times?		
	FM, WRM	***Conductivity – not impaired but high***	Linda Creek and lower Dry Creek below WWTP	
	FM, WRM	***pH Impaired***		
		❑ Dec to June	Dry Creek	
		❑ Summer	Lower Antelope	
	FM, WRM	***Ammonia – not impaired but concern***		
		❑ High in first flush	All	
		❑ High in summer	All	
	FM, WRM	***Nutrients - impaired***		
		❑ WWTP effect? (nitrogen, phosphorous)	Lower Dry Creek downstream of WWTP	
		❑ First flush (nitrogen, phosphorous)	All	
		❑ General	Linda Creek, lower Dry Creek	
		❑ Other areas, timing?		
	FM, WRM	***BMI indicated impairment***	All	
	FM, WRM	***Pesticide Impairment***		
		❑ Diazinon, Chlorpyrifos	Dry Creek, First Flush	
		❑ No indications for others		
	FM, WRM	***Heavy Metals impairment***		
		❑ Sediment?	Secret Ravine?	
		❑ Water column	Miners Ravine?	
	FM, WRM	***Sediment toxicity - general***	All?	

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
FLOOD STORAGE AND CONVEYANCE	FM, R-FHM, WRM, DG, PEI	***Barriers to Fish Passage*** ❑ Trapped behind or above ❑ Beaver dams ❑ Human dams ❑ Logs ❑ Fences ❑ Unscreened diversions ❑ Canal flow modifications may lead to stranding ❑ Sewer, water, and other infrastructure crossing stream beds ❑ Culverts		***Engineering*** ❑ Retrofit old bridges and culverts for fish passage and actual flood flow conveyance ❑ Require new devices to meet design requirements for flow and fish passage ❑ Retrofit old dams for fish passage ❑ Screen all diversions ❑ Survey all potential constrictions and measure/cross-check old model dimensions ❑ Measure and cross-check old model in-stream cross-sections for input into flood model ❑ Relocate sewer and water pipes that cross stream beds
	FM, R-FHM, WRM, DG, PEI	***Human Structures*** ❑ Under-designed culverts and bridges -> flooding ❑ Fences clogged with debris -> flooding ❑ Sediment deposition right behind dams -> reduced storage volume, habitat destruction		***Operations and Management Practices*** ❑ Develop a beaver management plan – document known dam locations ❑ Remove fences within the floodplain ❑ Excavate sediment from behind flow constrictions
	FM, R-FHM, WRM, DG	***Channelization*** ❑ Faster flow conveyance than natural (likely) ❑ Under-designed for current flood flows ❑ Reduction in floodplain area/storage ❑ Sediment transport modifications – reduced deposition on floodplain ❑ Destruction of channel complexity (habitat value) ❑ Increased scour of bridges and non-channelized sections		***Restoration of Habitat*** ❑ Restore floodplain area (amount) ❑ Restore channel complexity – create meanders, riffle-run-pool habitat, add woody debris (must check hydraulics and make certain flood flows are still passed) ❑ Device strategies to mitigate channelization ❑ Buy up easements of land with structures on it that are within the
		Beaver dams ❑ More of the dams in streams and harder to control		

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
		❑ Not designed for flood storage for human or geomorphological protection ❑ Sediment deposition right behind dams -> reduced storage volume, habitat destruction ***Conveyance Maintenance*** ❑ Cleaning debris -> destruction of habitat and protection ❑ Cleaning debris -> improved flood flow conveyance ❑ Faster flows -> bank erosion		floodplain ***Development BMPs*** ❑ Add off-stream regional detention for reducing flood flow peaks and peak timing; no net changes ❑ Add additional BMPs/restore areas to bring hydrology back to 'normal' conditions where practicable ❑ Develop guidance for planners, developers, and builders regarding on-site flow detention and water quality BMPs ***Mapping (GIS)*** ❑ Map constrictions (road crossing, culverts), channelized areas, other flow restrictions ***Studies*** ❑ Measure flows and flow pattern (hydrograph) ❑ Update DCW Flood Control Manual models – check land use, culverts, crossings, constrictions, other ❑ Document locations of channelization
SURFACE WATER		***Changes in Flow Regime***		***Studies***
	FM, R-FHM, WRM	❑ Higher flow -> bank erosion (worse if no riparian vegetation)	Miners Ravine, Secret Ravine	❑ Update Dry Creek Watershed Flood Control Plan model for current land use and projected
	FM, R-FHM, WRM	❑ Higher flow/flashier flow		❑ Stream gauging to calibrate hydrologic and hydraulic model
	FM, R-FHM, WRM	❑ Change in depth of flow		❑ Stream gauging to determine actual flow hydrographs
	FM, R-FHM, WRM	❑ Channel incising from high flow -> lowering of shallow groundwater table		❑ Stream gauging for stage-discharge relationships to determine pollutant loads when sampling for water quality
	FM, R-FHM, WRM, DG	❑ Downstream flooding		
	FM, R-FHM, WRM	❑ Ephemeral/intermittent -> perennial	Strap Ravine, all?	
	FM, R-FHM, WRM, DG	❑ Canals and irrigation water withdrawals and discharge		

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
		Waste Water Discharge		❑ Analyze flow data (statistical) to determine chronic problems and trends ❑ Determine location of all outfalls and amount of flow ❑ Document eroded areas
	FM, R-FHM, WRM, DG	❑ Flow augmentation in summer (dry season)		
	FM, R-FHM, WRM, DG	❑ Source from outside watershed (additions to local hydrology)		
	FM, R-FHM, WRM	***Agricultural and landscape drainage and runoff***		***Best Management Practices*** ❑ Encourage water conservation ❑ Meter all water use ❑ Implement post construction BMPs for stormwater detention
POPULATION GROWTH		***Increased Development***		***Best Management Practices*** ❑ Use 'Smart Growth" principles ❑ Institute water conservation practices ❑ On-site detention: no net changes in flow
	FM, WRM, DG	❑ Increased impervious surface area		
	FM, WRM, DG	❑ Increased impervious surface connectivity		
	FM, R-FHM, WRM, OSP, DG	❑ Reduction in riparian habitat and vegetation		
	FM, R-FHM, WRM, OSP, DG	❑ Changes in species communities and community dynamics (natives and non-native invasives)		***Public Education*** ❑ Educate public regarding good stewardship practices ❑ Encourage planting of native species ❑ Develop guidance for planners, developers, and permitting agencies, regarding bank erosion, removal of riparian vegetation, use of non-native invasive species, irrigation and drainage management ❑ Develop guidance for good stewardship practices and the role of individuals within the watershed.
	FM, WRM, DG	❑ Increased flood control – e.g., more structures		
	WRM, DG	***Greater demand on water supply***		
		Increased wastewater generation -> discharge to surface water		
	FM, WRM, DG	❑ Placer WWTP	Miners Ravine	
	FM, WRM, DG	❑ Roseville WWTP	Dry Creek	
	FM, WRM, DG	❑ Additional facilities?	?	
		More recreation use		
	FM, WRM, OSP, DG	❑ Increased trampling of banks and creek crossings by horses and off road vehicles		
	FM, WRM, OSP, DG	❑ Increased access?		
	FM, WRM, DG	❑ More parks?		

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
	OSP, DG	❑ More encroachment/inappropriate use of Open Space?		
GEOMORPH		***Reduction in Channel Complexity***		***Restoration and Design***
	FM, WRM	❑ Straightening		❑ Restore channel complexity
	FM, WRM	❑ Removal of woody and other debris		❑ Reduce sedimentation
	FM, WRM	❑ Bank erosion		❑ Restore floodplain
	FM, WRM	❑ Changes in gradient		❑ Design for both geomorphology and flood control
	FM	❑ Reduction in riffle/run/pool habitat	Dry Creek, Miners Ravine	
		Reduced floodplain area		
	FM, R-FHM, WRM	❑ Increased depth of flow (levees, incising, dams)		
	FM, WRM	❑ In-stream sediment transport/deposition		
	FM, R-FHM	❑ Reduced floodplain habitat		
		Changes in Flow Regime		
	RM, R-FHM, WRM	❑ Bank erosion	Throughout	
	RM, R-FHM, WRM	❑ Sediment transport, scour, and deposition modifications		
		Channel Incising		
	FM, WRM	❑ Placer mining	Strap Ravine, Secret Ravine	
	FM, WRM	❑ Higher flow		
	FM, WRM	❑ Channelization		
		Sedimentation		
	FM	❑ Fill in of interstitial spaces; reduction in fish and BMI habitat		
	FM, R-FHM	❑ Placer mine tailings	Secret Ravine	
	FM, WRM	❑ Reduction in flow depth/storage volume		
VEGETATION		***Removal of Non-Riparian Vegetation***	Throughout the watershed	***Mapping (GIS)***
	OSM	❑ Reduction in ecological community diversity		❑ Map extent of invasive species: density, area, types ❑ Map preserves, other Open Space,

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
	OSM OSM OSM OSM OSM OSM	❑ Reduction in habitat contiguous area ❑ Introduction of non-native invasive species ❑ Reduced habitat area ❑ Increased edge effect ❑ Reduced habitat for special status species ❑ Inadequate habitat for special status species		and potential habitat ***Studies*** ❑ Assess all habitat for quality and restoration potential ***Restoration*** ❑ Restore and revegetate areas with native plant species ❑ Eradicate non-native invasive species ❑ Preserve large contiguous corridors/areas ❑ Preserve more open space ❑ Develop Open Space Management plans for all areas, implement, and enforce them ❑ Obtain grants for funding management plan implementation and enforcement (e.g., interest on grants in trust) ***Education*** ❑ Prepare guidance for public regarding use of native plant species, identification of non-native invasive species, and appropriate BMPs for land surfaces/revegetation ❑ Educate local nurseries on what plants they may have that are non-native invasive plants ❑ Educate land owners regarding damaging grazing practices Assemble and train volunteer groups and other local citizens on eradication of invasive non-native plants and revegetation with native plants

Table 4.1. Specific Impacts, Stressors, and Specific Management Goals (Continued)

STRESSOR/ FACTOR	ISSUE†	SPECIFIC IMPACT	LOCATION	SPECIFIC GOALS
†Issues are identified as: FM = Fisheries Management, R-FHM = Riparian and Floodplain Management, WRM = Water Resources Management, DG = Development and Growth, OSM = Open Space Management, and PEI – Public Education and Involvement				