WATERSHED ASSESSMENT FOR TRIBUTARIES TO THE TRUCKEE RIVER

FINAL REPORT



Prepared for
Storm Water Permit Coordinating Committee

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REPORT ORGANIZATION

Report
The body of this report presents an overview of the condition of streams and watersheds that are tributary to the Truckee River. Each chapter presents assessment findings for watershed sub-basins. This includes a detailed narrative that presents observations and recommendations from stream assessments and physical description of sub-watershed land uses. Conclusions are provided at the end of each chapter. Also provided are tables showing stream health and recommendations for management and restoration actions. General recommendations are found at the end of the report. Appendix A contains reach by reach restoration and management recommendations.

Appendix A
For quick, at-a-glance, information go to Appendix A. Summary sheets of each assessment reach were prepared to provide a broad range of information in a quick, easy to use format. They describe the location of the watershed and stream reach, sensitivity to disturbance based on channel characteristics, and a brief discussion of the stream condition and health trend. Problems are identified and recommendations are presented. Also shown are effective and ineffective Best Management Practices.

Appendix B
Field data are presented in Appendix B. Data are presented in a reach by reach format that include assessment check lists, stream narratives, photographs, GPS locations, mapping, and assessment team observations. Appendix B is intended to provide very specific details of each assessment reach.

CHAPTER 1
INTRODUCTION

Introduction

In 2002, the Washoe County Department of Water Resources, the University of Nevada Cooperative Extension, and the Washoe-Storey Conservation District partnered to develop a Watershed Management and Protection Plan. Early in the planning process it was apparent that a comprehensive Watershed Assessment study was needed to establish baseline conditions. Watershed assessments of tributaries to the Truckee River were conducted in the spring of 2002, and provided a broad range of important information. During the development of the Watershed Management and Protection Plan it was determined that annual watershed assessments would be very valuable. Numerous public meetings and workshops were held and it was decided that if annual assessments were conducted they should:

- Answer questions about hydrologic function, water quality, and vegetative condition
- Determine if Best Management Practices (BMPs) are controlling storm water pollution
- Highlight opportunities to protect or enhance watershed functions
- Determine "health" trends for tributaries to the Truckee River.
- Locate weed populations
- Help planners focus available stream restoration resources for the greatest benefit
- Identify suitable locations for open space and multiple use trails
- Provide recommendations.

Early in 2005, The Truckee Meadows Storm Water Permit Coordinating Committee authorized watershed assessments for tributaries to the Truckee River. Funding was provided by the Cities of Reno, Sparks and Washoe County. Field assessments were conducted in July and August, using a process called Proper Functioning Condition (PFC) and the Rosgen stream classification method (Rosgen, 1994). Also included in watershed assessments are, photos, GPS locations of points of interest and a narrative that describes important observations.

This report is a summary of watershed assessment findings for:

- North Carson, Verdi, Peavine (Hunter, Alum, Sunrise, Dog, Unnamed stream that flows to Mogul, Chalk, Peavine, and North Evans),
- The North Truckee Drain,
- Washoe Valley (Musgrove)
- South Truckee Meadows (South Evans, Dry, Thomas, Whites, Galena, Jones, and Browns)

For organizational purposes, these streams are divided into upper, middle and lower reaches. Middle reaches, typically located on alluvial fans, are developing quickly and have a high potential to be impacted by construction related activity. These reaches are

assessed annually. This provides an opportunity to track trends, document the benefits of construction BMPs, and catch problems early. Lower and upper reaches are monitored alternating years. Streams located in the low reaches just upstream of the confluence with Steamboat Creek or the Truckee River are monitored less often since they are often built out and rapid changes are less likely to occur. Upper reaches are typically in good condition. Therefore, only a selected number of upper reaches are monitored at two-year intervals. Steamboat creek is not part of this assessment since it is already the focus of study by a number of groups including the University of Nevada and the Washoe Storey Conservation District.

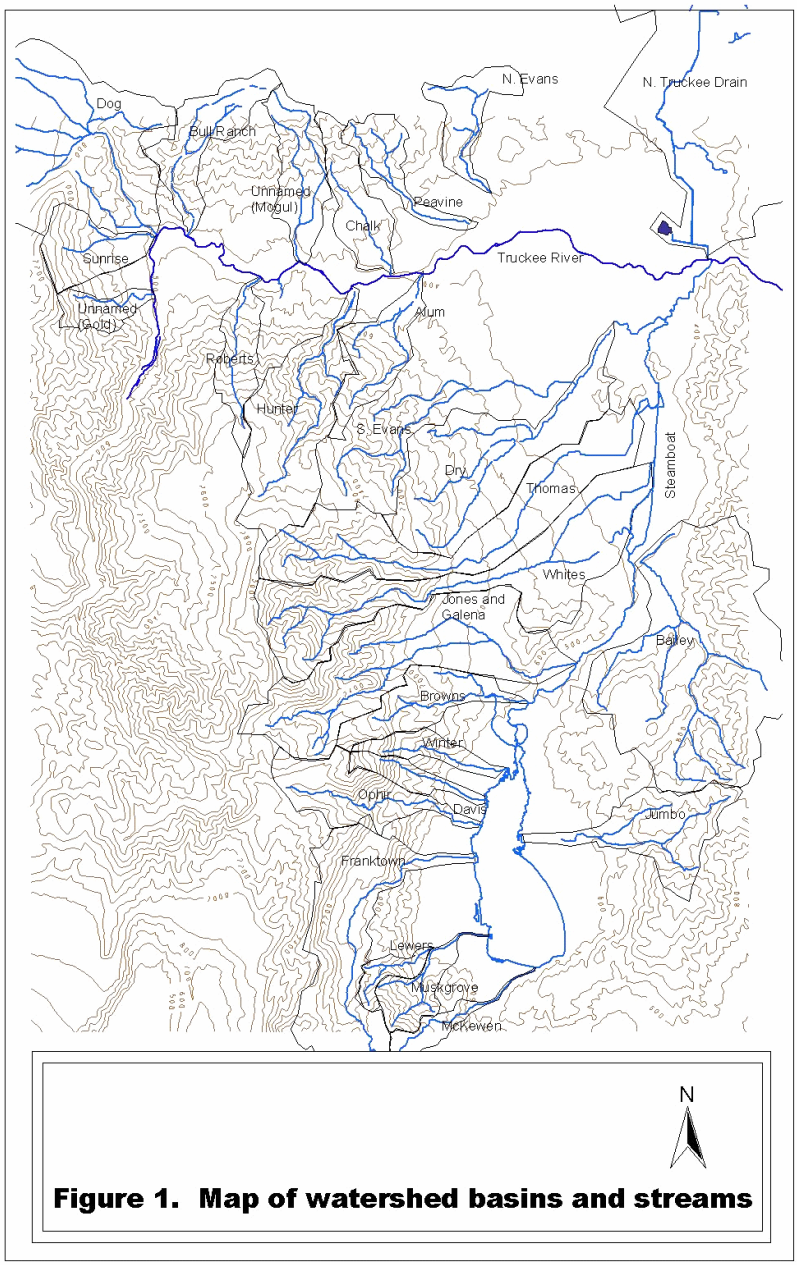

Figure 1. Map of watershed basins and streams

STREAM ASSESSMENT PROCEDURES

Watershed Assessment includes Proper Functioning Condition (PFC) assessment and the Rosgen Stream Classification System. The following provides a brief description of the procedures of each. Watershed assessments include stream classification, remarks and recommendations. Remarks provide a description of the watershed and a narrative of what the evaluators observe while walking the stream reach. This may include a description of vegetation, water clarity, bank erosion, siltation, or other specifics that stand out during the assessment. Digital photography is used to document critical and sensitive reaches, providing visual references for annual reports and for year to year comparisons of upward or downward trends for these particular reaches. Locations of observations are identified on a stream map that is included in Appendix B. Recommendations are provided in the form of a checklist that provides typical solutions to problems observed.

Proper Functioning Condition Defined

Proper Functioning Condition (PFC) is a qualitative assessment tool that applies an interdisciplinary team to evaluate streams and identify concerns. The method recognizes each stream's potential to respond to different management and restoration efforts or processes. Furthermore, some streams may be limited in their recovery by political, social or economic restrictions that cannot be removed, for example, moving an interstate highway to improve riparian conditions (BLM, 1998).

Riparian areas function properly when adequate vegetation, landform, or large woody debris is present to:

- Dissipate stream energy associated with high flows, thereby reducing erosion and improving water quality,
- Filter sediment, capture bed-load, and aid floodplain development;
- Improve floodwater retention and ground-water recharge;
- Develop root masses that stabilize stream banks against cutting action;
- Develop diverse ponding and channel characteristics to provide the habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses.
- Support greater biodiversity.

When a riparian area is in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation, they are called "functional-at-risk". This may be an indication that BMPs are not in place or inappropriately installed/implemented at construction sites, peak storm water flows have increased, or channels are impacted by culverts or road crossings. Nonfunctional areas are those lacking adequate vegetation, landform, or large woody debris to dissipate the stream energy associated with high flows. Consequently, these areas experience increased erosion, deteriorating water quality, and diminishing biodiversity. The absence of certain physical attributes, such as a natural floodplain, indicates nonfunctioning conditions. In the Reno-Sparks area, nonfunctional streams are typically impacted by development, encroachment and upstream uses.

PFC Assessment Procedures

The first step in assessing PFC is to determine the area of assessment. This includes establishing starting and ending points along a reach and delineating areas that share a common set of attributes and processes. The reach is walked by an interdisciplinary team of at least two individuals that have received PFC training. Ideally the team should consist of individuals with experience in hydrology, geomorphology, civil engineering, botany, and biology. Experience with local water resources and land use planning policies and procedures is also very helpful. The team should have a leader that initiates discussions and evaluates assessments to arrive at a consensus. Following completion of assessments, the team leader completes the remarks dialog to be included in the assessment write up. Remarks and recommendations should be mindful of objectives such as effectiveness of best management practices and benefits of responsible construction practices. Assessments also include photographs illustrating observations along the assessment reach. Five of the most critical aspects to observe in a PFC assessment include hydrogeomorphic processes, vegetation, erosion/deposition behavior, soil properties, and water quality. Each reach should be thoroughly evaluated on these parameters as well as trends in the respective conditions. While the checklist alone may not dictate the functionality of a stream, the evaluation provides a basis for discussion among the assessment team. Upon reviewing all of the data, the team may decide on one of the three assessments: properly functioning, functional-at-risk, or nonfunctional. The trend of the stream is also determined, and is of particular importance for at-risk conditions.

Rosgen Stream Classification System

The Rosgen Stream Classification System (Rosgen, 1994) is included primarily because of its ability to use a wide variety of at-a-glance attributes to quickly categorize a stream and, to some degree, predict its behavior. The system uses a number of common stream parameters in a step-by-step categorization process. The variables include entrenchment, width/depth ratio, sinuosity, slope, and channel material. The Rosgen Classification System is a common tool used to evaluate a stream's sensitivity to disturbance. The changes and adjustments a stream exhibits to a changing environment can be extrapolated to other streams of the same type.

N. CARSON, VERDI, PEAVINE

Tab Position 1

CHAPTER 2
NORTHERN CARSON RANGE-PEAVINE-VERDI CREEKS
Hunter, Alum, Dog, Sunrise, Unnamed Mogul, Chalk, Peavine, N. Evans, Roberts

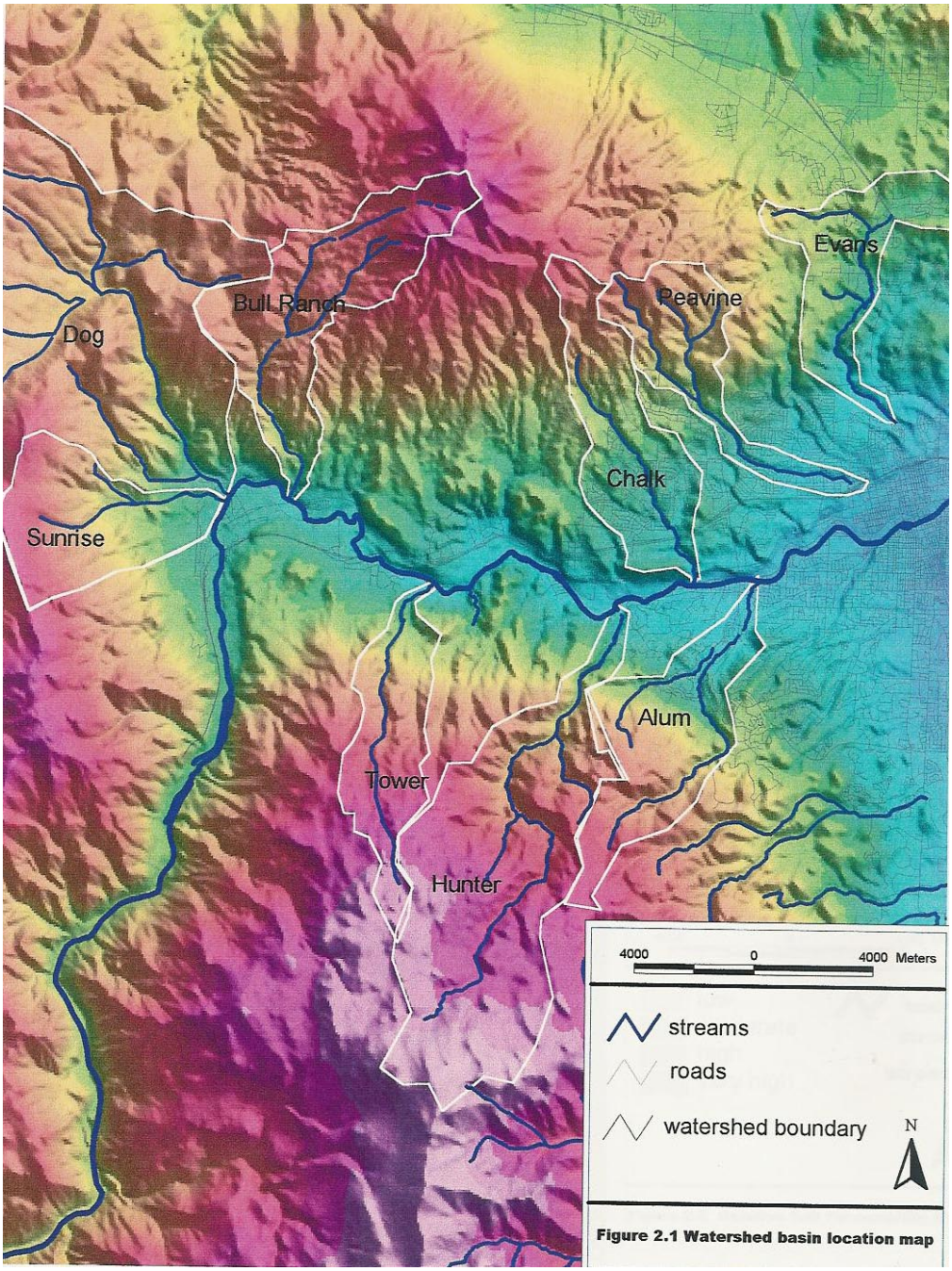

Figure 2.1 Watershed basin location map

Physical Descriptions
Alum, Hunter and Roberts Creeks have headwaters in the mountains west of Reno and south of interstate 80. They drain the north end of the Carson Range and flow roughly north to the Truckee River. Hunter Creek flows year round while Alum and Roberts creeks are ephemeral. Sunrise and Dog creek are located in the mountains northwest of Verdi. Dog Creek usually flows all year and sunrise dies up early in the summer. Peavine Creeks includes Unnamed Mogul, Chalk, Peavine and N. Evans, and they flow to the Truckee River from the South slopes of Peavine Mountain. Peavine Creeks are historically ephemeral; however runoff from new development results in year round flows in many of these streams. While these steams are typically ephemeral, their drainages can easily generate large flood flows in excess of 100 to 1,000 cfs (USGS, 1998). (Michael Widmer, Washoe County Department of Water Resources, 2002. Watershed Assessment For Tributaries To The Truckee River).

Hunter Creek
Hunter Creek is located southwest of Reno with headwaters in the Toiyabe National Forest, at about the 7000 foot level. It converges with the Truckee River near the Mayberry pedestrian bridge. The creek is fed by snow melt and numerous springs and typically flows year round. The drainage is relatively undisturbed. The stream is in very good condition. Dirt roads, trails and an irrigation canal crossing do not impact the creek. Vegetation continues to recover following a fire that burned the slopes and riparian vegetation in 1999. The healthy vegetation provides good habitat for wildlife such as deer, coyotes, small mammals and birds. Hunter Creek should be protected for its water clarity, wildlife habitat, and recreational opportunities.

Alum Creek
Alum Creek is located west of Reno with headwaters in the steep canyons of the Toiyabe National Forest. The stream flows down a canyon just east of the Hunter Creek drainage. Alum Creek is a seasonal stream, receiving flows from snow melt, storm events and a few intermittent springs. It also receives flows from irrigation ditches. The creek flows through the Caughlin Ranch Subdivision and terminates in the Truckee River, north of the intersection of Mayberry Drive and North McCarran Boulevard. The upper reach is relatively undisturbed with the exception of dirt roads and trails. Dirt roads that concentrate runoff, on the ridges above the creek, could be a source of sediment during storm events. The lower reaches flow through open space, located in low and medium density residential developments. The Soil Survey of Washoe County, Nevada, South Part, indicates that the Alum Creek canyon, and the channel within the alluvial fan, is prone to flooding during intense storm events and the risk of soil erosion is moderate.

The Seasons Subdivision, located in the upper reach, is a significant source of sediment. Stormwater runoff is directed down unprotected slopes above Alum Creek. Storm events, such as the 1997 flood, resulted in 6’ wide by 6’ deep gullies that extend over 100 lineal feet down steep banks. The source of the stormwater should be controlled and the gully should be armored to prevent further erosion.

The middle reach flows through manicured open space in residential settings. Desirable riparian vegetation is replaced by groomed turf sod with virtually no rushes, sedges, or woody plants adjacent to the stream. Turf sod does not have root masses capable of withstanding high stream flows and erosion is occurring. Bank and head-cut erosion were observed at many locations. It is also likely that nutrients are reaching the creek, since fertilizers and other lawn care chemicals are applied to the edge of the stream bank. It appears that riparian vegetation would quickly recover if an undisturbed buffer zone was established along the creek. Willows, alder, wood rose and other woody plants have established in un-maintained areas. Rushes and sedges also grow where sod is absent. Restoring the middle reach to a natural functioning and natural appearing stream should be a high priority. Costs may be relatively low and water quality benefits could be significant. The reach is relatively free of weeds, and only a few manageable colonies of tall whitetop were observed at the low end of the reach.

In the lower reach, vegetation is groomed turf sod with little or no woody riparian vegetation adjacent to the stream channel. Existing vegetation does not provide significant wildlife habitat. A riparian buffer zone along the creek would limit fertilizers, and other chemicals associated with lawn care, from reaching the stream. Grade controls consist of boulder placements and trail crossings. A pedestrian trail parallels the channel. Near the confluence of Alum Creek and the Truckee River, very good riparian vegetation was observed. The vegetation included rushes, sedges, willows, and other woody vegetation, and would be appropriate along the rest of the reach. A riparian buffer zone should be established along the creek to replace turf sod. A few manageable stands of tall whitetop were observed between McCarran Boulevard and Mayberry drive that should treated as soon as possible.

Dog Creek

The upper and middle reaches of Dog Creek flow through a terraced floodplain in the canyon setting and is relatively undisturbed by human activities.

The lower reach of the channel flows through a meadow setting and site of an abandoned ranch. The stream is pushed to the west slope of the valley and a berm confines the bank of the channel, placing the creek at the toe of a slope below homes and near a road. The confined channel appears stable due to rocky soils and riparian vegetation with strong root systems, however, there is a potential for erosion during unusually intense storm events.

Riparian vegetation is good habitat for deer, birds and small mammals. Water flows clear, however, healthy algae were observed in the creek that may be an indicator of under-treated septic reaching the stream.

Sunrise Creek

The headwaters of Sunrise Creek are developed by low-density residential homes, at about one house per five acre. Homes are on individual septic systems. A forest fire in

1994 removed most of the timber and brush from hills and riparian areas. Emerging Trees, shrubs and grasses provide protection from soil erosion. Vegetation along the channel is vigorous and healthy.

Tall whitetop was observed in the meadow near the Truckee River and should be treated to prevent spreading.

Unnamed Mogul Creek

The unnamed stream is located on the south slope of Peavine Mountain and has about five square miles of watershed. Headwaters are located at about the six thousand foot elevation where stream flows emerge from a small meadow and spring setting. The stream flows south in a relatively steep canyon through the new Summerset development. It passes just west of the Northgate Golf course, and converges with the Truckee River at an elevation of about five thousand feet near Mogul. The upper reaches usually flow well into the summer, while, historically the lower reaches dry up in early spring. Currently, runoff from the new development and the golf course appears to result in substantial flows throughout the summer. Riparian vegetation along the stream and at the springs provides very good wildlife habitat for deer, coyotes, small mammals, reptiles and birds. The stream is fed by springs, snowmelt, rain and runoff from development. The Soil Survey of Washoe County, Nevada, South Part indicates that runoff is very rapid and soils are moderately to very erodable in this reach. Revegetation for the purpose of erosion control may be difficult due to the very low available water capacity and shallowness of the root zone.

Rapid development within the upper reach of the unnamed stream that flows to Mogul results in large areas of open grading and steep unprotected slopes. It is often difficult to control erosion or capture sediment on these vast disturbances. While it appears there is an effort to implement best management practices, the scale of disturbances often makes adequate erosion and sediment control unachievable. Development has resulted in higher peak flows and channel incision, up to three feet deep, and bank erosion is occurring. Tamarack, a state listed noxious weed, appears to have been planted in the landscaping.

The middle reach of the unnamed stream that flows to Mogul is located south, or downstream, of the Summerset development in a steep rocky canyon. The reach ends at a flume that carries Highland Ditch flows over the canyon and stream. A multiple use trail parallels the stream in this reach. The trail also serves as access for a sewer pipeline. The pipeline was installed in 2002 and includes rockery walls, rip rap slopes and landscaping. The stream is rejuvenating following the pipeline installation. Vegetation is healthy and the riparian zone is expanding. This is the result of runoff from residences and golf course irrigation. Vigorous riparian vegetation and rocky soils limit the risk of significant channel erosion. Thistle and tall white top were observed at the top of the reach. The weeds are manageable now and should be treated soon. Tamarack, a state listed noxious weed, are planted in the landscape and should be removed.

The low reach has a very straight alignment and is confined by back yard property lines. Channel banks are very steep and unvegetated. The lack of vegetation results in soil

erosion and thermal heating. Water clarity is significantly worse in the lower reach and large algae populations were observed, possibly due to under treated sewage from individual septic systems. Downstream of development, vegetation is healthy despite steep banks and the straight alignment. A limitation to reestablishing riparian vegetation is that it may interfere with flood conveyance. Tall whitetop was observed along the lower reach, mostly upstream of the I-80 crossing.

Chalk Creek

The stream is located on the south slope of Peavine Mountain, flows east of McQueen High School and parallels Rob Drive. Headwaters are at about the seven thousand-foot level. The stream converges with the Truckee River at an elevation of about five thousand feet. The upper reach is fed by runoff from storm events and snow melt and usually dries up early in the summer. Lower reaches typically flow year round due to runoff from development. Riparian vegetation along the upper reach of the stream provides very good wildlife habitat for deer, coyotes, small mammals, reptiles and birds. The middle reach of the stream is within a park setting and is paralleled by multi use trails. Natural vegetation and channel geometry is preserved and the stream is in good condition roughly above Simons Drive. Below Simons Drive, channel geometry is good, but desirable native vegetation competes with very tenacious colonies of tall whitetop. Downstream of the freeway crossing, tall whitetop is the dominant plant.

In the upper reach, water enters the creek near Mae Anne. The source is not clear. It may be spring seeps, flows from improperly functioning septic or sewer systems, or runoff from residential and commercial landscape irrigation. Water clarity is poor and an unusually high amount of algae was observed. Water chemistry tests (Watershed Assessment for Tributaries to the Truckee River, Final Report, July 1, 2002) indicate that dissolved solids and nutrients affect water quality. Some of the dissolved solids are the result of salts leaching out of the soil and some may be from improperly functioning sewer lines and over applications of lawn care chemicals. Sediment does not appear to influence the system. Vegetation is good and includes willows, cottonwood trees, and typical native brush. Some rushes and sedges are growing along the channel. In the lower part of the reach tall whitetop weeds threaten native vegetation. A management plan should be developed that controls weeds and encourages the existing riparian vegetation.

The middle reach begins at the Simons Drive crossing and ends at Interstate 80. A multiple use trail appears properly designed and does not impact the channel. Development does not encroach on the stream and Channel geometry is good. Tall whitetop weeds are the most significant. Whitetop out-competes desirable riparian vegetation resulting in a loss of; wildlife habitat, water quality benefits, and resistance to erosion. Best management practices are needed at a construction site above the steep fill slopes east of the middle reach. Silt fences and sediment rolls are damaged and filled to capacity. High flows concentrated at the construction site are channeled down the slope, resulting in channel erosion. BMPs should be maintained and additional controls may be needed. Water clarity is poor in the reach and algae growth indicates nutrients may be a problem.

Downstream of the Freeway crossing, the lower reach has a variety of configurations. The upper part has relatively undisturbed channel geometry, however it is severely impacted by tall whitetop weeds. Whitetop has virtually replaced desirable riparian species north of the Highland Ditch crossing. A whitetop eradication plan should be developed that may include improved access to the banks of the channel to allow mowing and herbicide treatment. Less tall whitetop was observed where the channel is narrow; therefore, reducing the width of the channel upstream of the Highland Ditch may simplify whitetop control. Below the highland ditch vegetation improves, but the stream is channelized along access roads. While roads encroach on the stream, rocky soil and good riparian vegetation limit erosion and the stream appears to function rather well. Except for invasive weeds, the stream is in good condition in the reach and would be a good site for open space and multiple use trails.

Peavine Creek

Peavine Creek is one of a number of drainages that flow from the southeastern flanks of Peavine Mountain. These drainages, that were once used for agricultural irrigation are now residentially developed and densely urbanized. The stream flows mostly in response to snow melt and rain storms. Peavine Creek posed flooding threats to the community; therefore, substantial flood control structures have been built along the reach. Flows from Peavine Creek are retained in these structures and flow downstream is rare. The channel effectively terminates at a large flood control structure located near Clayton Jr. High School. Vegetation along the reach consists of willows, rushes, sedges and colonies of tall whitetop weeds. The Soil Survey of Washoe County, Nevada, South Part indicates that the risk of soil erosion is high which could result in siltation of flood control structures. Reclamation seeding is challenging due to steepness of slopes and poor soil characteristics. Substantial flood control structures have been built along the Peavine Creek, and two large detention basins effectively trap sediments before they reach the Truckee River.

In the upper reach, poor best management practices resulted in significant gully erosion, up to eight feet deep and six feet wide. Sediment was deposited in the stream channel and flood control structures. The source of sediment may have been eliminated by completion of grading activities at construction sites. New development also results in higher peak flows in the channel resulting in incision and bank erosion in the steep canyon. Downstream, sediment deposited in the channel damages existing riparian vegetation and the disturbed soil invites colonization of noxious weeds such as thistle and tall whitetop. It is important that developers along the reach implement effective stormwater pollution prevention plans and comply with National Pollution Discharge Elimination System rules. Tall whitetop should be controlled along the reach.

In the middle reach, the stream flows in response to residential lawn irrigation, storm events and perhaps poorly functioning water supply and sewer lines. Stream flows provide water for lush riparian vegetation that serves as good wildlife habitat. Flows may also create mosquito breeding habitat in ponded areas. Discussions with locals indicate that mosquito abatement has occurred along the creek. This may have included channel

work to prevent ponding, removal of riparian vegetation and applications of pesticides. Channel erosion was observed in the vicinity of mosquito abatement and may be the result of removal of riparian vegetation. An access road was recently constructed, presumably for the purpose of culvert maintenance. The road encroaches on the flow line of the channel and could be damaged during high flows. Large colonies of tall whitetop and thistle were observed.

N. Evans Creek

North Evans Creek is located on the south slope of Peavine Mountain and is part of a municipal park and system of multiple use trails. The upper watershed was altered by the Rancho San Rafael residential development. Grading, for the approximately 100 acre subdivision, consists of substantial cuts and fills that economize development. The upper Evans Creek channel was filled and flows are now conveyed in a four food diameter concrete culvert that discharges to a relatively small basin. The new culvert outfall defines the upper boundary of Evans Creek. Stormwater runoff from the new development may be problematic, including poor armoring of drainage swales, a damaged culvert, and trenching that could concentrate storm flows. In some locations invasive weeds threaten native vegetation in the reach. Stormwater controls should be inspected and improved as needed and a management plan should be developed that controls weeds.

The middle reach flows down a narrow rocky channel with steep valley slopes. Springs, rain, snowmelt and runoff from development provide some flows to the reach year round, however, during summer months water infiltrates into the gravely, sandy channel a few hundred feet downstream of the seeps. Riparian vegetation provides good habitat for coyotes, small mammals, reptiles and birds. Multi use trails parallel the floodplain along the toe of the slopes. Trails are situated appropriately and do not appear to impact the channel. In some locations invasive weeds threaten native vegetation. A management plan should be developed that controls weeds and encourages the existing riparian vegetation. This may include mowing and use of herbicides that are approved for the wetland setting. Overall, the middle reach is in good condition and an excellent site for open space and multi-use trails.

In the low reach, irrigation flows provide most of the in-stream flow; however, it is also fed by springs, rain, snowmelt and runoff from development. The valley floor consists of a relatively wide floodplain covered with lush riparian vegetation and excellent wildlife habitat. Vegetation and channel geometry has been preserved and the stream is in good condition. The reach incorporates multiple use trails, interpretive signage, board walks and picnic areas.

Invasive weeds threaten native vegetation along the reach. A management plan should be developed that controls weeds and encourages the existing riparian vegetation. This may include mowing and use of herbicides that are approved for the wetland setting. Overall, the reach is in good condition.

Roberts Creek

Roberts Creek is located at the north end of the Carson Range with headwaters located mostly within the Toiyabe Forest. The watershed is very large and the highpoint of the drainage is at an elevation of about 9000 feet. Stream flows are fed by snow melt, storm runoff and numerous high mountain springs. The upper watershed is relatively undisturbed, with the exception of a few dirt roads. The stream does not appear to be impacted by road crossing or drainage problems. Within the last few years, a fire burned the slopes and riparian zone within much of the watershed. This resulted in some channel incision and bank erosion. This is a natural process and the stream is rejuvenating nicely. The natural characteristics of the upper watershed are valuable to the public and make this an excellent site for multiple use trails. This would help connect the community to the stream and encourage involvement in watershed issues. An alluvial fan extends from the base of the steep Roberts Creek canyon to the banks of the Truckee River. Historically these low lands were irrigated pastures used to grow hay and graze livestock. In the 1980s, ranch property was subdivided for low density residential development. These relatively new home sites rely on well water and individual septic systems.

The lower reach flows through ranch property, low density residential developments and undisturbed areas between the Steamboat Ditch and the Truckee River. Ranch property appears to be managed reasonably well.

Two home sites are especially problematic in the reach. Construction has resulted in grading and disturbances very near the edge of the stream channel. Just across the creek, an existing residence has removed several hundred lineal feet of riparian vegetation and replaced it with landscape sod and ornamental plants.

Tall whitetop was observed growing in two pastures-not adjacent to the creek. A plant that looks similar to tall whitetop is cultivated in a yard adjacent to an irrigation canal, and should be investigated.

Table 2.1
Physical description statistics

Watershed	Drainage area (sq mi)	Average range in streamflow (cfs)	Range in precipitation (in)	Range in elevations (ft)
Hunter	11.7	5-20	12-56	4,600-7,900
Alum	4.9	0-5	10-40	4,560-7,400
Dog	26.1	1-20	16-45*	4,840-8,100
Chalk	4.6	0-2*	8-14	4,595-6,000
Peavine	2.4	0-3	8-16	4,760-6600
Evans	3.8	0-2	10-12	4,480-5,580

*Estimates as there are little or no measured records.
(Michael Widmer, Washoe County Department of Water Resources, 2002. Watershed Assessment For Tributaries To The Truckee River).

Land Use

Land use within these watersheds is diverse, ranging from national forest to areas of high-density residential, commercial and industrial use. The City of Reno and Washoe County share the lower watersheds. Development is primarily residential. Residential development, west of the City of Reno, is located in Verdi, Mogul and the Belli Ranch areas. The western and southern watersheds within this sub-basin are largely unaffected by development. However, on the southern slopes of Peavine and the Carson Range, high density development occurs throughout the watersheds of Alum, Chalk, Peavine, North Evans, and the Unnamed drainage above Mogul.

Conclusions

Invasive Plants

Alum, sunrise, unnamed Mogul, Chalk, Peavine, North Evans and Roberts watersheds all harbor invasive plant species, particularly tall whitetop and scotch thistle weeds. Both Tall White Top and Scotch Thistle are problems because they out-compete native plants, do not provide useful habitat, and are difficult to eradicate. Also, they not have root masses capable of resisting erosion and often infested areas exhibit channel instability. Weed management programs should include improved access to affected areas, mowing, revegetation with grass species and-when grasses are established-selective treatment with an approved herbicide.

Stream health rating

Problems include loss of riparian vegetation, erosion, sedimentation and invasive weeds. Table 2.2 lists the Functioning condition for each creek, based upon the assessments. Residential development, construction activities and invasive weeds are impacting these watersheds. Sedimentation in active construction areas may be a temporary problem, however erosion, due to increased peak flows, may continue. Restoration efforts may be successful for some reaches listed non-functional or functional-at-risk and are marked with an asterisk (*). Other problematic stream reaches may require weed control programs or changes in management.

Table 2.2
Stream Health Ratings

Stream	**Reach**		
	upper	**mid**	**lower**
Hunter		Functional	Functional
Alum		Non-Functional*	Non-Functional*
Dog			Functional
Sunrise			Functional-at-Risk
Unnamed Mogul	Functional-at-Risk	Functional-at-Risk	Non-Functional
Chalk	Functional-at-Risk	Functional-at-Risk	Functional-at-Risk
Peavine	Functional-at-Risk	Functional-at-Risk	Functional-at-Risk
N. Evans	Functional-at-Risk*	Functional-at-Risk	Functional-at-Risk
Roberts			Functional-at-Risk

* restoration is possible

Stream Action Items

Results of stream surveys are compiled into Table 2.3. The table provides general restoration and management efforts needed to improve stream conditions. Where restoration actions are needed priority is shown. Priority is based on the potential of restoration efforts to be successful and practicality of treatments. Also included is the trend of the stream health. More detailed information and recommendations are found in Appendix A and B.

Table 2.3
Stream Action Items

Creek	Trend	Restoration Priority	Reshape channel banks	Restore channel floodplain	Restore riparian vegetation	Stormwater runoff treatment	Control encroachment	Reduce lawn care chemicals	Control invasive weeds	Enforce construction site BMPs	Public education	Control impacts from vehicles	Monitor water chemistry	Monitor channel stability		
Hunter middle	not apparent															
Hunter lower	not apparent															
Alum middle	downward	high		X	X			X	X		X		X			
Alum lower	downward	high		X	X			X	X		X		X			
Dog lower	not apparent													X		
Sunrise lower	not apparent								X					X		
Mogul upper	downward				X				X	X			X			
Mogul middle	upward								X				X			
Mogul lower	not apparent	low			X		X		X				X			
Chalk upper	downward							X	X		X					
Chalk middle	downward					X			X	X			X			
Chalk lower	not apparent	med	X		X				X							
Peavine upper	downward					X			X	X						
Peavine middle	upward						X		X	X	X		X			
N Evans upper	downward					X			X	X	X	X				
N Evans middle	not apparent								X							
N Evans lower	not apparent								X							
Roberts lower	downward	med			X	X			X	X	X					

NORTH TRUCKEE DRAIN

Tab Position 2

NORTH TRUCKEE DRAIN

CHAPTER 3
NORTH TRUCKEE DRAIN

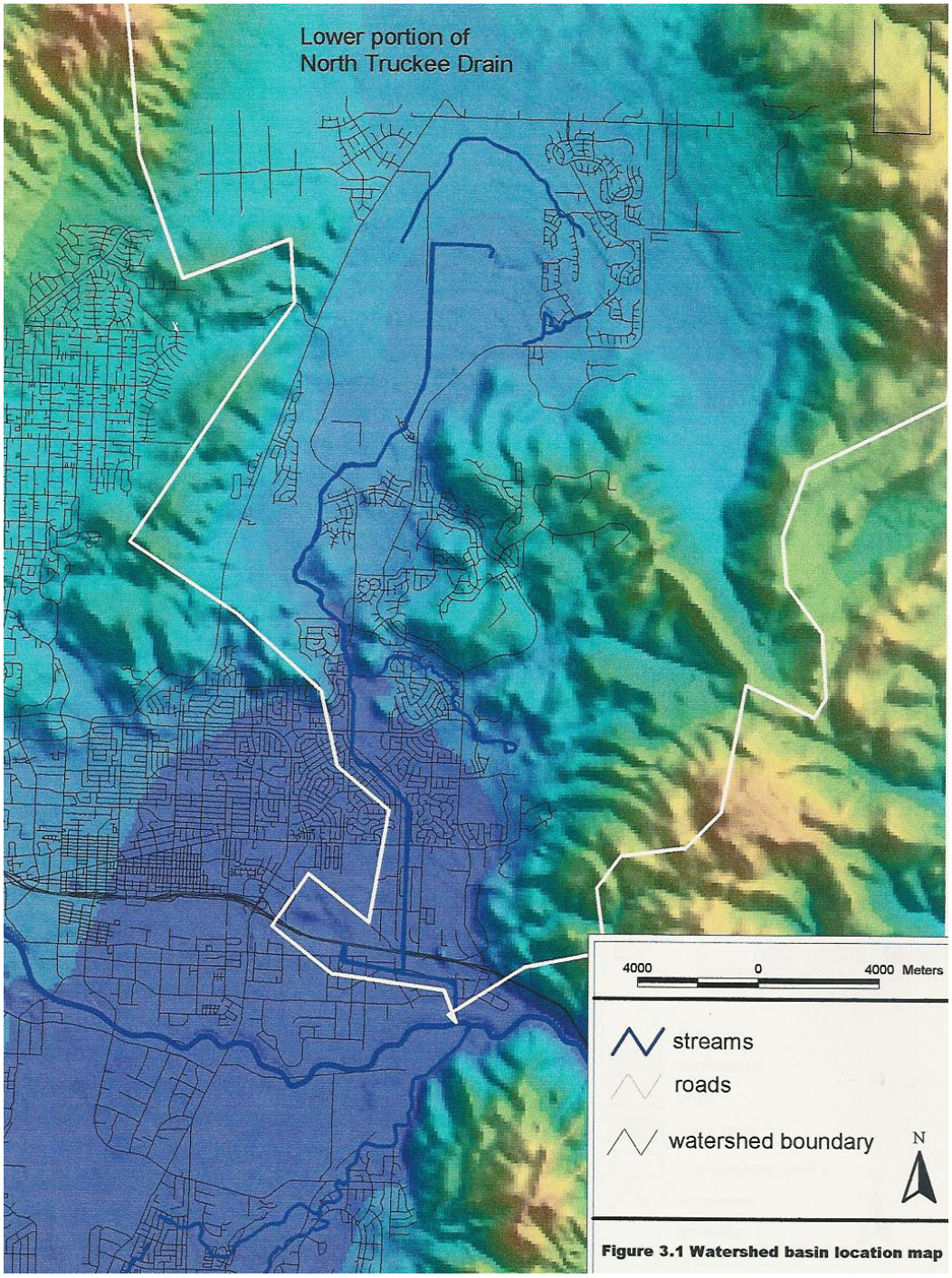

Figure 3.1 Watershed basin location map

Physical Descriptions
The North Truckee Drain originates near Wingfield Springs. It flows south through Spanish Springs Valley, then parallels Sparks Boulevard and crosses Interstate 80 near Wild Island. It meets the Truckee River just south of the Alamo Truck Stop. There are no perennial streams in this watershed. Truckee River water was imported into Spanish Springs through the Orr Ditch. Tail water from flood irrigation and springs are collected through the North Truckee Drain and are exported back to the Truckee River.

In the upper reach, flood channels are rejuvenating following construction. The banks are somewhat weedy; however, seeded and volunteer species are beginning to emerge. Vegetation within the channel bottom is robust in most locations and good habitat for wildlife. Channel geometry is suitable for the landscape setting and appears wide enough to convey anticipated flood flows without damage to property or the environment. A low flow channel is developing as riparian vegetation increases and in some areas it was excavated to reduce vector breeding habitat. Weed control may be challenging in the flood control channels. If not managed, tall whitetop and purple loosestrife weeds could out-compete native species.

The middle reach begins at the South end of Spanish Springs Valley where the developed flood control channel ends. The North Truckee Drain has a slightly steeper gradient as it flows through the ranch setting. The agricultural property is used to produce hay and cattle. The stream is channelized and moved to the edge of the valley to simplify pasture management. Vegetation along the creek provides wildlife habitat and is mostly pasture grasses with some riparian species at the edge of the channel. Much of the channel is fenced to keep livestock out of the creek. Flood flows can spread out across the pasture without damaging property and would probably not cause significant erosion. Tall whitetop and purple loosestrife are growing along the banks of the creek. Discussions with the ranch owner indicate that weeds have been treated with herbicides.

Restoration may be appropriate if the ranch property is developed. This may include excavation to develop an appropriate floodplain and create a meandering low flow channel. Development should not encroach on the channel. High flows should have room to spread out across a wide floodplain without confinement by private property.

A large housing development is under construction near the top of the reach. The development is characterized by cuts and fills that are retained with rockery walls. The channel is confined, in some locations, by rock retaining walls and temporary soil stockpiles. BMPs are in place, but would benefit from better placement and proper maintenance.

In the lower reach, the North Truckee Drain enhances Sparks Boulevard by serving as open space with multiple use trails and landscaped areas. The channel has a very straight alignment with steep banks in the range of 2:1 to 3:1. Road crossings and rock grade control structures prevent channel incision. Water clarity is fair, but blue green algae may indicate high nutrient levels. The water has a rust color and the visibility is about

one foot. Golf courses, ball fields and urban stormwater runoff may cause the poor water quality. Vegetation along the channel is poor to very good. Willows, trees, rushes and sedges are doing well in some areas, while weed control affects vegetation in other areas. Evidence of weed management was observed and appears to be effective. Some woody vegetation is cut to improve flood characteristics; however root structures are left intact. Flood flows are conveyed without damage to property and the banks of the channel resist erosion. Vegetation along much of the channel provides good wildlife habitat.

Water quality and vegetation appear to have improved since the 2002 assessment. This may be a result of higher flows, improved construction BMPs, and improved vegetation in the upper watershed. Possible channel improvements include erosion control on steep unvegetated channel banks, better channeling of stormwater to prevent rill erosion, improved ranching practices at the small horse properties near the top of the reach, and continued weed management.

The lowest reach is from Interstate I-80 to the Truckee River. In this reach, the channel flows through commercial and industrial properties with very straight alignment and virtually no characteristics of a natural stream. The banks of the channel are very steep, up to 15 feet high and are unstable. This contributes sediment to the channel during flooding and high flows. Willows grow along the banks of the channel and provide some soil reinforcement and wildlife habitat. Water clarity is fair with visibility of about 12 inches. A sediment plume is visible where the North Truckee Drain enters the Truckee River.

Restoration and management activities may include reducing the steepness of the channel banks to prevent erosion and encouraging riparian vegetation. Slope stabilization may be needed where encroachment makes channel widening unpractical. Water pollution sources should be identified and pollution ordinances enforced.

Table 3.1
Physical description statistics

Watershed	Drainage area (sq mi)	Average range in streamflow (cfs)	Range in precipitation (in)	Range in elevations (ft)
North Truckee Drain	76.7	1 - 5	7-14	4,380-7,400

Land Use
Spanish Springs Valley is currently zoned for single family residences, commercial properties and golf courses. The southern portion of the drain is zoned single family residential with some commercial properties as is the central portion of the drain. The last 1.5 miles of the drain are zoned commercial and industrial. (Michael Widmer, Washoe County Department of Water Resources, 2002. Watershed Assessment For Tributaries To The Truckee River).

Conclusions

Invasive plants

The upper channel is relatively free of the invasive plant, tall whitetop and purple loosestrife; however, these plants have colonized most of the wetlands surrounding the flood control channel. Weeds are found in the drain throughout the portion that parallels Sparks Boulevard, but are relatively well controlled by herbicide treatments. Tall whitetop and purple loosestrife are a potential problem because they out-compete native plants, do not provide useful habitat, and are difficult to eradicate. Populations of invasive weeds may be controllable, but treatments must begin soon

Stream Health Rating

Figure 3.2 illustrates the results of the drain assessment whereby most of the drain is rated functional at risk. The drain is at risk from sediment resulting from poor best management practices, encroachment by development and the presence of invasive weeds. The most southern portion of the drain is rated as non functional. This is due to erosion of the stream banks, the proliferation of tall whitetop, sediment being transported to the Truckee River, and at risk from various sources of pollution, and lack of native vegetation.

Table 3.2
Stream Health Ratings

Stream Reach	**upper**	**middle**	**lower**	**lowest**
North Truckee Drain	Functional at Risk	Functional at Risk	Functional at Risk	Non Functional

Stream Action Items

Results of stream surveys are compiled into Table 3.3. The table provides general restoration and management efforts needed to improve stream conditions. Where restoration actions are needed priority is shown. Priority is based on the potential of restoration efforts to be successful and practicality of treatments. Also included is the trend of the stream health. More detailed information and recommendations are found in Appendix A and B.

Table 3.3
Stream Action Items

Creek	Trend	Restoration Priority	restore low flow channel	Erosion control channel banks	Restore channel floodplain	Restore riparian vegetation	Stormwater runoff treatment	Control encroachment	Reduce lawn care chemicals	Control invasive weeds	Enforce construction site BMPs	Public education	Control impacts from vehicles	Monitor water chemistry	Monitor channel stability
North Truckee Drain upper	upward	med	X			X			X	X	X			X	
North Truckee Drain middle	downward							X		X	X			X	
North Truckee Drain lower	upward	med		X		X	X		X	X				X	
North Truckee Drain lowest	not apparent	med			X	X	X		X	X				X	X

Tab Position 3

WASHOE VALLEY

WASHOE VALLEY

CHAPTER 4
WASHOE VALLEY
Musgrove Creek

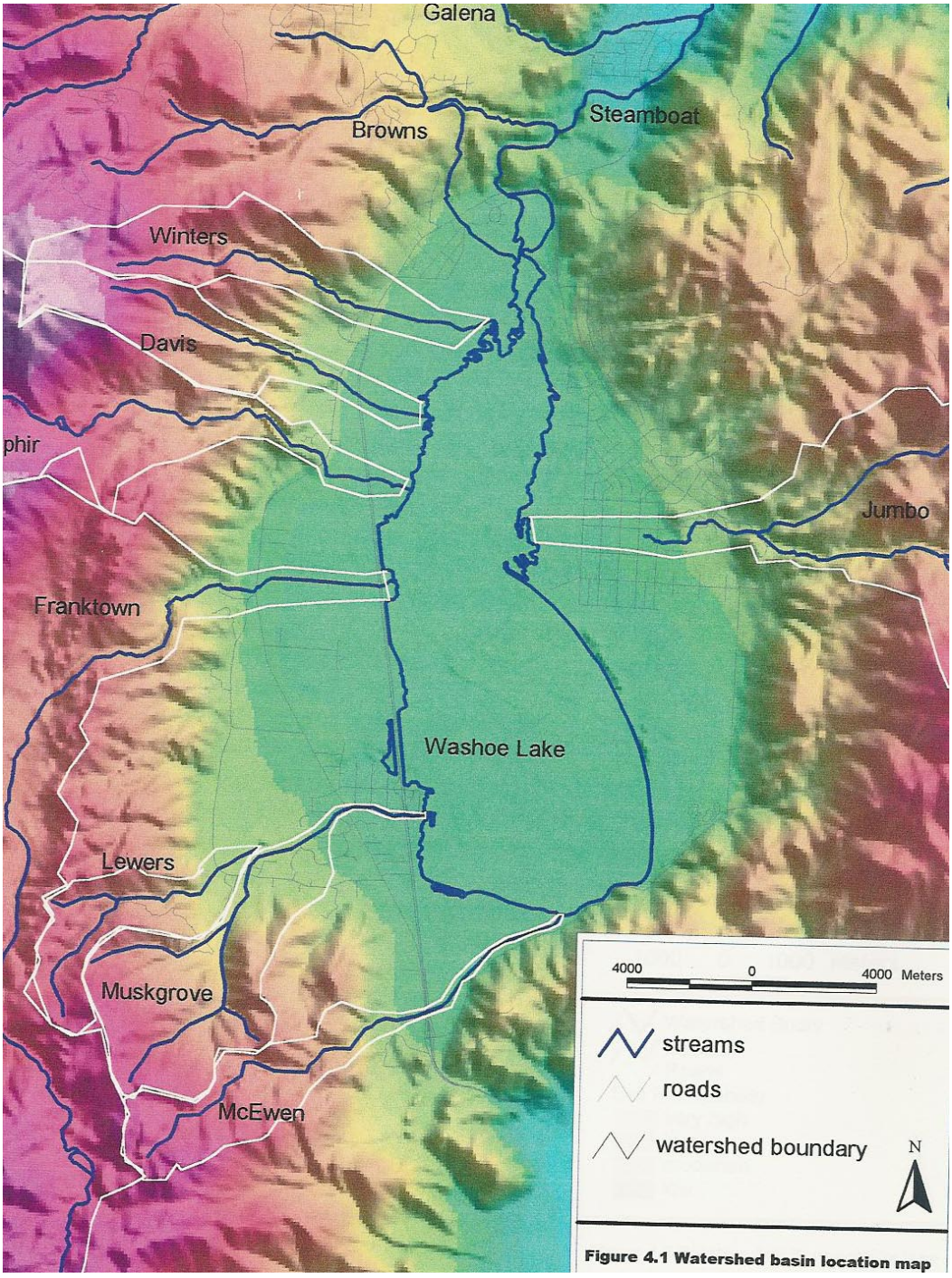

Figure 4.1 Watershed basin location map

Physical Descriptions
The perennial creeks of Washoe Valley flow from the Carson Range eastward and discharge into Washoe Lake. Outwash from creek drainages formed alluvial fans where they emanate from the mountain block canyons. Below the alluvial fans the creek waters often disperse into wetlands or infiltrate into the coarse, granitic soils. The western side of Washoe Valley historically was irrigated with these waters. Today, residential development and one golf course have only marginally changed the manner of use of these creeks.

Musgrove Creek is the only stream assessed in Washoe Valley. It flows from the east slope of the Carson Range and enters the South end of the valley in a low density, urban setting. Road development and housing construction is occurring in the Musgrove Creek canyon and should be monitored to ensure best management practices are implemented. Below Franktown Road, the creek flows through the Lightening W Golf Course, low density residential development and small ranches before entering the South end of Washoe Lake.

The middle reach begins at Franktown Road and ends at old Highway 395. A small section of Musgrove Creek flows through a ranch where riparian vegetation has been replaced by pasture grass. The banks of the creek are steep and minor erosion was observed in this short section-about 300 feet. Base flows enter the Lightning W Golf Course in a natural appearing and natural functioning channel that is in good condition. A good buffer zone is maintained along the creek. This is a good practice because it provides an area that is free of fertilizer applications and provides a strip of rushes and sedges that efficiently utilize excess nutrients before they enter the creek. The wetland buffer zone is marked with signage and access is restricted. The golf course protects the stream and treats it as an amenity to their property.

Table 4.1
Physical Description statistics

Watershed	Drainage area (sq mi)	Average range in streamflow (cfs)	Range in precipitation (in)	Range in elevations (ft)
Musgrove	3.0	0-2	16-40	5,030-8,000

Land Use
Most of the land is under residential development, used for agriculture or is public land (US Bureau of Land Management and US Forest Service). There are very few lands used for retail purposes and one parcel for industrial purposes. The agricultural parcels are used mostly for pasture, hay crops or livestock. (Michael Widmer, Washoe County Department of Water Resources, 2002. Watershed Assessment For Tributaries To The Truckee River).

Conclusions

Invasive Plants

None were observed

Stream Health Rating

The stream is well maintained by property owners and the golf course and it is in good condition in the reach.

Stream Action Items

No action items are recommended on this reach of Musgrove Creek. More detailed information can be found in Appendix A and B.

Tab Position 4

S. TRUCKEE MEADOWS

S. TRUCKEE MEADOWS

CHAPTER 5
SOUTH TRUCKEE MEADOWS
S. Evans, Dry, Thomas, Whites, Jones, Galena, Browns

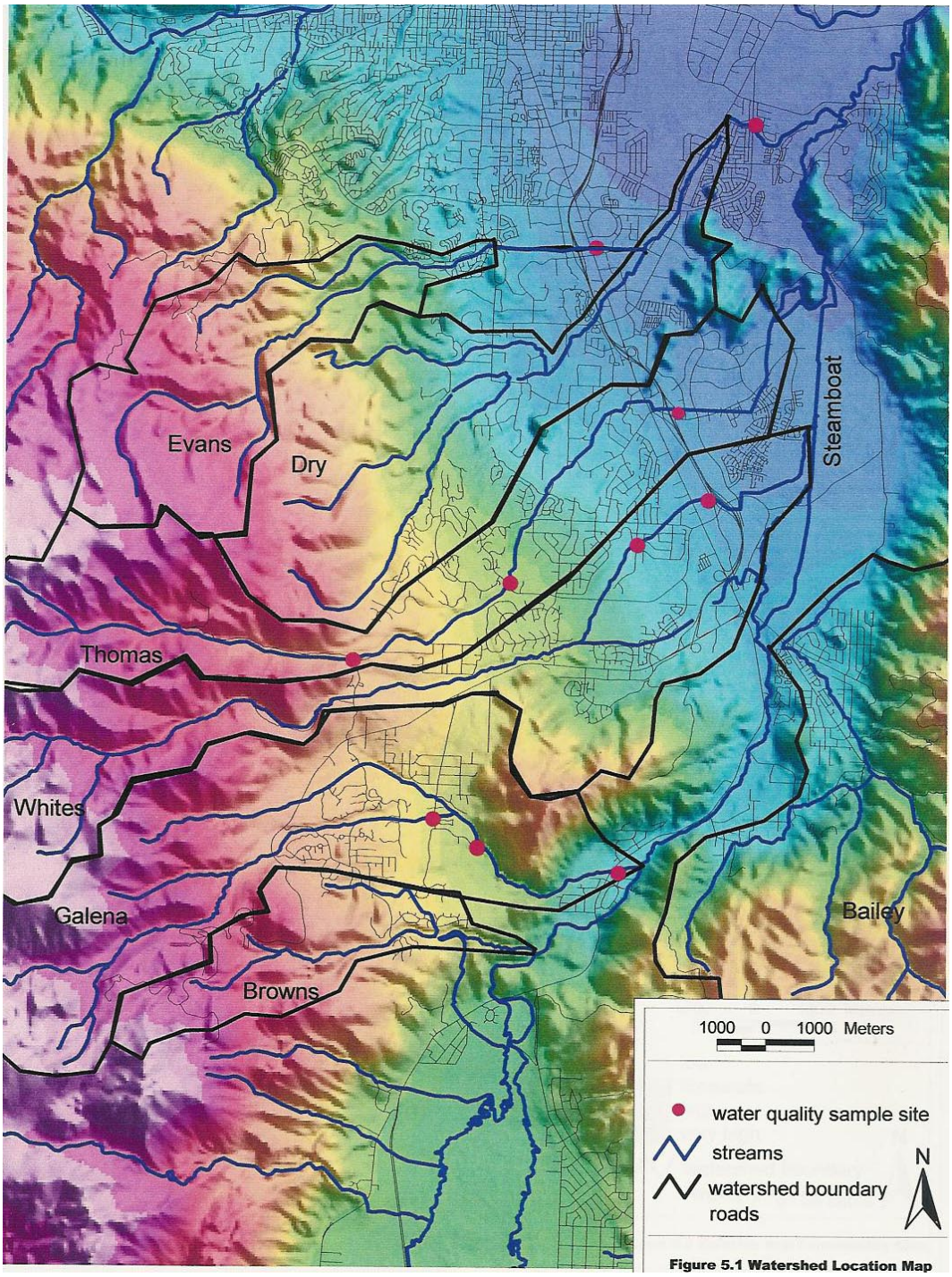

Figure 5.1 Watershed Location Map

Physical Description
These creeks are the largest tributaries to Steamboat Creek, and drain the east slope of the Carson Range, a chain of the Sierra Nevada Mountains. Their primary source of water is snowmelt during the winter and spring months and groundwater supplied base flow from the Carson Range in the late summer and fall. These creeks represent some of the largest flowing creeks in the community with average flows ranging from 1 to 32 cfs (Widmer, 2000). Flood flows on any of these creeks can easily reach 100 cfs or greater.

South Evans Creek
South Evans Creek flows from the east slopes of the sierras in three tributaries that converge just south of the Lake Ridge Golf Course and subdivision in southwest Reno. The upper reach flows from steep canyons, through medium density residential developments. West of Lakeside Drive, the creek is relatively undisturbed and riparian vegetation provides excellent wildlife habitat.
At Lakeside drive the creek enters Bartley Ranch Park where it is entrenched and confined by levies that protect nearby developments from flooding. Downstream of Bartley Ranch Park, Evans Creek crosses Del Monte Lane and flows to Anderson Park. The flooding event of 1997 created a large sediment plume where the stream enters the park. Weeds are colonizing the disturbed soil. Much of the stream has been channelized through the park to simplify pasture management. Downstream of the park the channel has been widened to control flood flows through a new business development. The new channel is beginning to vegetate with desirable riparian vegetation that resists erosion. Large rock-weir grade control structures also limit the risk of erosion. Downstream of the business complex, the stream crosses under the freeway and shopping centers in a long concrete box culvert. The stream emerges from the culvert at South Virginia Street in an unvegetated eroding channel. Water clarity is poor and the channel has no characteristics of a natural stream. Just downstream of South Virginia Street, Evans Creek is conveyed in a concrete lined channel that transitions to dirt near the Sierra Pacific Power Company's South property line, and then Evans converges with Dry Creek.

The upper part of the middle reach is channelized, resulting in banks that are unstable and eroding. Flood events cause property damage in about ten year intervals. Riparian vegetation along the channel is limited to wood rose, willows, cottonwood and elm trees. Cheat grass, sage and rabbit brush grow on the banks of the channel. Rushes and sedges were not observed. Water quality is impacted by sediment from erosion and possibly septic systems, and waste from livestock. Tall whitetop and thistle are observed along the reach. Improved best management practices at construction sites and along ditches and drainages that flow to the creek may prevent sediment from entering the creek during storm events. Lake Ditch water that has poor clarity enters Evans Creek.

The middle part of the middle reach flows through Anderson Park. The park is flood irrigated pasture used for grazing cattle and growing hay. In some cases, irrigation tail flows have poor clarity as they enter the creek. The poor clarity is probably a result of sediment entering the irrigation ditches from upstream construction sites that do not maintain best management practices. Creek flows have been channeled through a large

sediment plume, deposited during the 1997 flood, to simplify pasture management. A large colony of tall whitetop and thistle exist in the disturbed soil. The banks of the new channel appear well vegetated with riparian plants; including rushes, sedges and willows, that are capable of resisting erosion. A ranching operation stockpiles horse manure on the banks of the stream. This may be a significant source of nutrients to the stream. A culvert under the South end of Bonde lane acts as a grade control. Downstream, the straight channel is severely incised with very steep eroding banks. Tall whitetop and thistle are colonizing the banks and threaten to out-compete desirable riparian vegetation.

In the low part of the middle reach, Evans Creek enters a broad channel intended to convey flood flows through a business park. The floodplain of the channel is about 150 feet wide with banks that are sloped at 3:1. A meandering low flow channel enters a series of weirs and pools. Good riparian vegetation is emerging along the channel and the rocky bed material appears to resist erosion. Tall whitetop and thistle were observed at several locations. The colonies are manageable at this time and should be controlled by the property owner. Stormwater drainage from an unvegetated ditch along Kietzke Lane enters the channel at the top of the flood channel. This drainage should receive erosion control so it is not a source of sediment. The broad channel and lack of shade trees may result in thermal heating of the creek.

The lower reach begins at South Virginia Street and ends at the confluence with Dry Creek, just east of the Sierra Pacific Power Company. The creek is confined in flood control channels as it flows through commercial properties in relatively flat terrain. The straight alignment, lack of riparian vegetation and hard armoring limit the channels natural characteristics. Woody vegetation is removed to improve flood flows. This reduces the usefulness of the stream for wildlife habitat. Water quality is impacted by land uses upstream, that include; animal waste, poorly functioning individual septic systems, soil erosion, and stormwater runoff from roads and commercial properties. Water clarity is poor and algae are observed growing in the creek. The channel design appears adequate to convey flood flows without damage to property. Establishing woody riparian vegetation and realignment of the low flow channel would improve the appearance of the channel and improve wildlife habitat. This may also provide water quality benefits. Upstream impacts should also be addressed.

Dry Creek

The headwaters of dry creek originate at about the 7000 foot level in four rather arid canyons in the mountains above south-west Reno. The upper reaches are dry much of the year and only flow following storm events and in the spring as the snow pack melts. Springs occur at about the 5000 foot level where the tributaries transition from the east slope of the Sierras to the alluvial fan. The springs provide stream flows late into the summer. Three main tributaries of Dry Creek come together downstream of Lakeside Drive and Holcomb Lane to form a single channel near Panorama Drive. The stream crosses South Virginia Street just north of the Huffaker Lane intersection and flows east in a broad flood control channel that ultimately converge with Steamboat Creek.

The middle reach begins where Dry Creek tributaries cross Lakeside Drive and ends at South Virginia Street. High energy flows from culverts under Lakeside Drive have resulted in some localized erosion at Lakeside Drive stream crossings. Damage is limited by rocky soils and good vegetation. The tributaries are in relatively good condition as they flow through the small ranches. Typically grazing practices limit livestock access to the channel and many pastures that were previously grazed are now used to grow hay. Pasture management appears good. Few bare areas were observed, weed management programs control tall whitetop and thistle and riparian vegetation is healthy. It appears that land owners may have experienced an increase in land values and are protecting the stream as an amenity to their property. Perhaps grazing has declined, as property owners rely less on cattle production to support the small ranches.

Dry Creek flows intermingle with ditch flows at canal crossings. This mixing results in a significant decline in the clarity of the Dry Creek water. In a few locations, Dry creek is incorporated into residences landscaping. Often the landscape species have week root systems and bank erosion occurs. Downstream of Huffaker Lane the stream is conveyed in a wide flood control channel through moderately high density developments that include residential and commercial property. Steep banks near Huffaker Lane may erode and become a source of sediment. Tall whitetop and thistle weed control will continue to be a challenge along the reach. Several large weed colonies exist in the upper portion of the reach near Lakeside Drive and Holcomb Lane and in a few locations near Panorama and Timothy Lane and tall whitetop is beginning to out-compete desirable riparian vegetation in the wide flood control channel upstream and downstream of Huffaker Lane.

Poor water clarity at Huffaker lane may be the result of; improperly functioning septic systems, irrigation tail water flows that transport nutrients from livestock waste, and dirty ditch water diverted to Dry Creek.

Thomas Creek

The headwaters of Thomas Creek are at about 9000 feet and originate in a lush alpine bowl about two miles north of Mount Rose peak. Flows from fifteen or more springs converge in a large meadow where a meandering channel forms. The stream flows east down a rocky steep canyon vegetated by aspen trees, willows, service berries, choke cherries, wood rose, alder and other woody plants. Soils are further stabilized by dense carpets of native grasses, sedges, rushes and forbs. The upper reach of Thomas Creek is relatively undisturbed with the exception of a dirt road and multiple use trails. The creek emerges from the steep canyon near Timberline road and flows down the alluvial fan through low density housing developments. In the low country, the stream enters a blend of ranch property and large 3 to 10 acre residential lots near Thomas Creek Road. East of South Virginia Street, Thomas Creek is conveyed in flood control channels before it ultimately converges with Steamboat Creek.

The middle reach of Thomas Creek begins at Steamboat Ditch. The location is about ½ mile south-west of the intersection of Foothill and Thomas Creek Road. This section of Thomas Creek is relatively undisturbed and exists as a natural functioning and natural

appearing stream. The creek resists erosion and there is little risk of damage to structures during flood events. Riparian vegetation is healthy, wildlife habitat is good and Water quality is not impacted. Residential landscaping and ranching has resulted in the loss of some riparian vegetation at the tail end of the reach, however, it appears that a narrow buffer zone is maintained and fencing prevents livestock from getting into the creek. The reach would be an excellent site for multiple use trails that would connect the community to the watershed. Noxious weeds were not observed along the reach.

In the lower part of the middle reach, Thomas Creek flows through large residential lots. Historically the land was irrigated pasture that produced hay and livestock. Ranching operations realigned the stream channel to optimize pasture irrigation. Best management practices should be implemented at home construction sites along Thomas Creek to prevent sediment from entering the stream. Several colonies of tall whitetop weeds ranging from 200 to 400 square feet were observed. Development encroaches on the creek near South Virginia Street and residential landscapes replace more desirable native species in the higher density neighborhoods. Maintenance and repair services at a car lot near the South Virginia Street crossing may contribute hydrocarbons to the stream during storm events that produce runoff.

Whites Creek

South Fork

The headwaters of Whites Creek originate at about 9000 feet in the numerous springs and snow fields situated just north of Mount Rose peak. The stream flows down the steep, rocky canyons east from the ridgeline. The upper watershed is relatively undisturbed with the exception of properly constructed trails used for hiking, biking and off highway vehicles. Vegetation along the stream includes; aspen and alder trees, willows, wood rose, service berry, dogwood, rushes and sedges. The narrow floodplain is blanketed with native grasses and forbs that resist erosion. The rocky soil and woody debris also resist erosion. Flood flows during the 1997 flood resulted in some vertical instability and horizontal instability. This is a natural process and the channel is recovering.

The south fork of the middle reach begins at the concrete splitter box and flows through the low density Government Housing Tract. The stream is in very good condition in the reach, however, upstream sediment sources include runoff from the Mount Rose Highway, infrastructure development and housing development. Several construction sites, including a pipeline installation, were observed operating without best management practices.

Below the Government Housing Tract, the south fork of Whites Creek does not retain characteristics of a natural functioning or natural appearing stream and more closely resembles a ditch. Property owners have incorporated the channel into their landscapes using inappropriate vegetation and building materials. Small colonies of tall whitetop were identified along the creek. Improved best management practices at construction sites and along drainages could benefit water quality. Restoration of the creek in the upper part of the reach would be challenging in the high-density urban settings since

encroachment by roads and development limit opportunities to create a functioning riparian corridor. Restoration opportunities do exist at the South Valley Regional Park. This would be an excellent site for a demonstration stream restoration project. The stream could be restored to a natural functioning condition with appropriate channel geometry and riparian vegetation. Easy access to the stream would provide opportunities for locals to connect with the watershed.

The lower reach of the south fork crosses under the Freeway and flows along the North property line of a large retail mall that is under construction near the intersection of Mt. Rose and South Virginia. The stream channel was relocated to accommodate development and the new channel was completed in 2003. The restored channel has good form and riparian vegetation is emerging. Several small colonies of tall whitetop and other weeds were observed along the banks of the new channel. A lack of erosion or sediment control at the adjacent construction site has resulted in severe erosion of slopes near the channel and sediment is accumulating in the stream. Erosion and sediment control best management practices should be implemented in accordance with the project's storm water pollution prevention plan and the rules of the National Pollution Discharge Elimination System. A program should be implemented to control the spread of tall whitetop and other weeds.

Whites North Fork

The north fork of Whites Creek begins at the concrete splitter box, located just east of Thomas Creek Road and flows from south to north along a fault scarp. The reach ends at Arrow Creek Parkway, just upstream of the Wolf Run golf course. The stream exists in an undisturbed natural condition along this reach.

North of Arrowcreek Parkway, the creek enters the Wolf Run Golf Course. Ntive vegetation serves as a good buffer along most of the reach. The stream characteristics resist erosion and the channel geometry is in balance with the riparian setting. Woody vegetation such as willows, alder and roses are cut at some locations to improve golf course playability, but root systems are left intact. Turf sod adjacent to the creek should be allowed to revert to rushes and sedges to improve the channels resistance to erosion. Application of fertilizers and other turf treatment appears responsible and golf course maintenance protects the stream zone. Tall whitetop exists in a few locations; however it appears to be controlled by an ongoing management program of cutting and pulling.

Just east of the Wolf Run Golf Course, the creek enters an older housing development. The stream was realigned and straightened to economize construction of the 1960s residential development. Vegetation is limited to a narrow band of woody plants along the channel bottom. Native vegetation is often removed to improve flows or enhance residential landscapes. Intense storm events cause bank erosion and channel incision that requires continued maintenance. The lack of riparian vegetation buffer zone along the stream may result in excessive lawn care chemicals and sediment entering the creek.

The lower part of the south fork extends from Zolezzi Lane to South Virginia Street. Existing development is set back from the stream and provides room for the stream to

access the floodplain during high flows. The reach would be an excellent location for a multiple use trail. A large piece of property, located near the South Virginia Street stream crossing, is currently for sale. Planners should ensure the stream is protected during development so that its value for flood control, water treatment, wildlife habitat and recreational opportunities are preserved. Tall whitetop and thistle weeds were observed along the reach.

Jones Creek

Jones Creek flows from the east slope of the Sierras near the Mont Rose Highway. The headwaters are in National Forest and are relatively undisturbed. Low density development along the creek begins east of the Mount Rose Highway and does not appear to significantly encroach on the stream.

This reach of Jones Creek begins at the edge of private property, about a mile upstream of the Callahan Ranch Road Crossing and ends at the confluence with Galena Creek. A multiple use trail begins at this point and parallels Jones Creek. The trail does not impact the stream and provides an opportunity for locals to connect with the creek. Volunteers periodically do maintenance along the creek, including control of tall whitetop and other weeds, repair of stream crossings and trash removal. Downstream of Callahan Ranch Road, Jones Creek is incised two to three feet. Jones Creek erosion may be the result of head cut erosion working its way up from the confluence with Galena Creek, about ¼ mile downstream. Banks of Jones Creek are eroding and the incised channel is widening as a new floodplain develops. Several stands of tall whitetop were observed along the channel, as well as in the meadow downstream of Callahan Ranch Road. Best management practices should be implemented at housing construction projects along Callahan Ranch Road to prevent sediment from entering Jones Creek.

Galena

The headwaters of Galena Creek are located between Mount Rose and Slide Mountain at about the 7000 foot level. Much of the upper reach is located in pristine wilderness area and is undisturbed. East of Galena Park, the creek flows through low density residential developments in a relatively undisturbed natural condition. About two feet of stream channel incision resulted from the 1997 flood. Roots are exposed and steep banks still exist in some areas. This appears to be a natural process and riparian vegetation is healthy and stabilizes soils from rapid erosion.

In the middle reach, Galena Creek flows from a broad meadow near Callahan Ranch Road to a steep rocky canyon. The creek is relatively undisturbed. The channel geometry is in balance with the watershed and topography. Vegetation is healthy and provides good wildlife habitat.

The 1997 flood event incised the channel two to three feet. The erosion appears to be a natural process, however erosion appears to have been accelerated downstream of the Callahan Ranch Road box culvert where the channel is confined by berms. The berms prevents the creek from spreading across the meadow during high flows, this increases channel erosion. The berms were apparently built to protect a development in the

adjacent meadow. The Soil Survey of Northern Nevada indicates that the meadow development may be at risk of flooding during unusually intense storm events.

Tall whitetop was observed at several locations in the meadow near Callahan Ranch Road and along the creek in Pleasant Valley. Best management practices implemented at the I-580 bridge construction site are typically good. Some sediment control features could benefit from maintenance and existing drainage swales require armoring.

Browns

Headwaters of Browns Creek are located on the east slope of the Carson Range at about the 7000 foot level, just north of Slide Mountain. The stream flows east down a rocky steep canyon vegetated by aspen trees, willows, service berries, choke cherries, wood rose, alder and other woody plants. The upper reach of Browns Creek is relatively undisturbed with the exception of a multiple use trail. At the base of the mountains Browns Creek enters low density residential developments. Developments and roads typically do not encroach on the stream. Below the housing developments the stream is relatively undisturbed, with the exception of dirt roads and drainage swales that direct stormwater runoff to the stream. A large span bridge for the I-580 Freeway is under construction over the creek. The bridge construction site is about a mile northwest of Jubilee Hill at the South end of Washoe Valley. Browns Creek enters Steamboat Creek in a pond setting just downstream of Little Washoe Lake.

The middle reach of Browns Creek begins at the Joy Lake Bridge and ends at Steamboat Creek. The creek was significantly altered during the 1997 flood. This resulted in bank erosion and up to twenty inches of channel incision. Riparian vegetation along the floodplain is rejuvenating nicely and provides good wildlife habitat. Development does not encroach on the stream and flood flows are conveyed without damaging property. Water quality is not impacted along the reach.

A storm drainage swale with a poorly designed outfall was observed and, while best management practices at the bridge construction site are good overall, addition maintenance of erosion and sediment control features may protect the stream from receiving sediment.

Table 5.1
Physical description statistics

Watershed	Drainage area (sq mi)	Average range in streamflow (cfs)	Range in precipitation (in)	Range in elevations (ft)
Evans	9.0	1 - 5*	10-44	4,440-8500
Dry	14.8	0 - 3*	10-32	4,395-7,800
Thomas	16.1	3 - 8	10-56	4,420-10,000
Whites	18.5	4 - 16	10-60	4,420-10,780
Galena	18.5	7 - 32	11-60	4,770-10,780
Browns	5.2	0 - 4*	11-40	5,000-7,900

*Estimates as there are little or no measured record.

Land Use

Land use within these watersheds is diverse ranging from federally designated wilderness to areas of high-density commercial and industrial use. The City of Reno and Washoe County share the lower watersheds. The upper headwaters of all the creeks are in national forest (Evans, Dry, Browns) or wilderness (Galena, Whites, Thomas). The creeks flow through rural, single family residential developments, and golf courses (ArrowCreek, Montruex, Wolf Run) upon their middle reaches. Thomas and Dry creeks also flow through small ranch lands upon the lower-mid reaches. This is also the case for the very lower portion of Galena Creek. Upon reaching US 395 the creeks (excluding Galena and Browns) flow through commercial and industrial properties. The most intense industrial properties are on Dry Creek east of US 395. Near the confluences with Steamboat creek Dry, Thomas and Whites flow again through agricultural, residential and golf course properties (Hidden Valley and Rosewood Lakes). (Michael Widmer, Washoe County Department of Water Resources, 2002. Watershed Assessment For Tributaries To The Truckee River).

Conclusions

Invasive plants

Within these watersheds the most prevalent invasive plant species is tall whitetop. This plant is a problem because it out-competes native plants, does not provide useful habitat or forage, and is difficult to eradicate. The figure illustrates that Tall Whitetop is a problem in the lower reaches of Evans, Dry, Thomas and Whites creeks particularly east of US 395. Serious consideration should be given to an eradication program particularly east of US 395. Other forms of invasive biota were not discovered or noted.

Stream health rating

Middle reaches of South Truckee Meadows streams were assessed. Streams that exist in a natural appearing and undisturbed condition are rated as Proper Functioning Condition, while streams that are impacted by development or having invasive weed issues are considered Functional at Risk. Non Functional steams have little or no characteristics of a proper functioning stream due to realignment, encroachment and loss of habitat.

The most obvious problem for these creeks is erosion, sedimentation. This is due to development encroaching upon or alteration of the creeks and stormwater discharges to the creeks. Colonization of invasive weeds may have a very big impact on stream channels. Table 5.2 lists the ratings for-up to-three reaches on each creek, based upon the assessments.

Table 5.2
Stream Health Ratings

Creek	**mid-reach**		
	upper	**middle**	**lowest**
Evans	Non Functional*	Functional at Risk*	Non Functional*
Dry		Functional at Risk	
Thomas	Proper Functioning Condition	Functional at Risk	
south fork Whites	Functional at Risk	Functional at Risk*	Functional at Risk
north fork Whites	Functional at Risk	Proper Functioning Condition	Functional at Risk
Jones		Functional at Risk	
Galena		Functional at Risk	
Browns		Proper Functioning Condition	

* restoration is possible

Development and ranching activities have impacted Evans, Dry and Thomas creeks. The alteration of these streams by man and livestock cause an increase in erosion, increased sediment load and degradation of water quality. Encroachment by residential development on Whites creeks on the lower mid-reaches have created excessive erosion, head cutting, steep banks and therefore increased sediment loads as well as a loss in flood protection. Restoration efforts can be successful for many of the reaches listed critical and or sensitive and are marked with an asterisk (*).

Stream Action Items

Results of stream surveys are compiled into Table 5.3. The table provides general restoration and management efforts needed to improve stream conditions. Where restoration actions are needed priority is shown. Priority is based on the potential of restoration efforts to be successful and practicality of treatments. Also included is the trend of the stream health. More detailed information and recommendations are found in Appendix A and B.

Table 5.3
Stream Action Items

Creek	Trend	Restoration Priority	Reshape channel banks	Restore channel floodplain	Restore riparian vegetation	Stormwater runoff treatment	Control encroachment	Reduce lawn care chemicals	Control invasive weeds	Enforce construction site BMPs	Public education	Control impacts from vehicles	Monitor channel stability	Reduce livestock impacts	Monitor water Chemistry
S. Evans upper middle	not apparent	high	X	X	X				X	X					
S. Evans middle middle	upward	high	X	X	X				X	X				X	
S. Evans lower middle	upward					X			X						
S. Evans lower	not apparent	low		X	X	X							X		X
Dry middle	upward								X					X	
Thomas upper middle	not apparent														
Thomas lower middle	not apparent	low			X				X	X					
S. Whites upper middle	not apparent									X					
S. Whites middle middle	not apparent	high	X	X	X				X	X					
S. Whites lower middle	upward					X			X	X					X
N. Whites upper middle	not apparent														
N. Whites Golf Course	not apparent								X						
N. Whites middle middle	not apparent	low			X			X			X				
N. Whites lower middle	upward						X		X						X
Jones middle	upward								X	X					
Galena middle	upward								X	X					
Browns middle	upward											X			

recommendations are made based upon maintaining or improving the functionality of each stream.

1. Stream assessments should continue. This will help identify areas where improvements to channel function, vegetation, water quality and sediment transport can be made.

2. Determine the source of poor water clarity in the various irrigation canals. This may include visual observation and water chemistry tests. It would require cooperation and access from ditch companies

3. A comprehensive weed management program should be developed that includes: programs to improve access to infested areas, methods of mowing or removing weedy vegetation, replacement with desirable grasses and, after grasses are established, selected use of herbicides.

4. Conduct water quality monitoring at selected locations to determine sources of pollutants.

5. Increase construction site erosion control through enforcement and education in association with the stormwater program.

6. Actions should be taken at areas identified as having good potential for restoration. This type of work can be as simple as re-vegetating the creek with native plants or as complicated as excavation to develop floodplain.

7. Ranching operations are potential sources of nutrient (nitrogen and phosphate) loading to the Truckee River, particularly for Thomas, Evans, and Dry Creeks. Public education should be used to alleviate this problem.

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APPENDICES

APPENDIX A
Stream Reach Summaries

APPENDIX B
Stream Assessments (separate volume)

Tab Position 5

APPENDIX A

N. CARSON,
VERDI,
PEAVINE

Tab Position 1

Reach Summary: Hunter Creek, Middle and Lower

Location

Hunter Creek is located in the hills above west Reno. These reaches begin at Steamboat Ditch and end where the creek converges with the Truckee River near the Mayberry pedestrian bridge.

Sensitivity to Disturbance

Low, the stream may be resilient even if the watershed or the channel are disturbed

Condition

Proper Functioning Condition, Hunter Creek exists in a natural undisturbed condition. Development does not encroach on the stream and riparian vegetation resists erosion. Water Clarity is very good.

Trend

Stable, Assessments conducted in 2002 are very similar to current assessments.

Problems

- Soil cleaned from the Steamboat Ditch is a potential source of sediment to the creek
- Medusa head, a very competitive non-native grass was observed at a burn area
- Thistle observed along the channel
- Bank and channel Erosion has occurred following a recent burn and is a natural process
- Alder trees along the creek are dying

Best Management Practices-Ineffective

- Does not apply

Best Management Practices-Effective

- Does not apply

Recommendation, Proactive

- Promote multiple use trails to connect the community to the watershed
- Protect functioning riparian areas from degradation
- Monitor weeds and problems with alder trees
- Monitor soil cleaned from ditch

Recommendation, Management

- Does not apply

Recommendation, Restoration

- Does not apply

Reach Summary: Sunrise Creek, Lower

Location

Sunrise Creek flows to the Truckee River from the hills northwest of Verdi. It flows roughly parallel, and to the south of Dog Valley Road.

Sensitivity to Disturbance

Low, Rocky soils and good vegetation limit the risk of channel erosion.

Condition

Functional at Risk, due to tall whitetop weeds observed along the creek near the Truckee River.

Trend

Not apparent, however, tall whitetop weeds were not reported during the 2002 assessment and were observed this assessment.

Problems

- Tall whitetop weeds were observed near the confluence of the creek and the Truckee River.
- Minor erosion was observed in a few locations. This may be a natural result of a recent forest fire in the upper watershed.

Best Management Practices-Ineffective

- Does not apply

Best Management Practices-Effective

- Does not apply

Recommendation, Proactive

- Monitor areas where channel erosion was observed
- Monitor the spread of tall whitetop weeds

Recommendation, Management

- Control tall whitetop weeds

Recommendation, Restoration

- Does not apply

Reach Summary: Alum Creek, Middle and Lower

Location

West Reno, South of Interstate 80. Alum Creek flows through the Caughlin Ranch Development, crosses Mayberry Drive and enters the Truckee River near the intersection of Mayberry Dr. and McCarran Blvd.

Sensitivity to Disturbance

Moderate, The stream may be relatively resilient if the channel or watershed are disturbed.

Condition

Non-Functional due to poor channel geometry, lack of riparian vegetation, and excessive erosion and sediment deposition

Trend

Downward. Assessments conducted in 2002 indicate declining hydraulic conditions, fair riparian vegetation, and no erosion/deposition. The stream was determined to be functional-at risk, and the trend was declining. The 2005 assessment shows the stream is non-functional due to poor stream functions. The downward trend continues.

Problems

- Storm water runoff from the Seasons Subdivision is directed to unarmored banks of Alum Creek resulting in erosion and silting of the channel.
- Riparian vegetation is replaced by landscape sod
- Tall whitetop weed colonies
- The stream channel is eroding.
- Dirt dumped, in the channel to repair bank erosion, becomes a sediment source.
- Lawn care chemicals may be entering the creek.
- Poor water clarity

Best Management Practices-Ineffective

- No controls are in place to prevent erosion or capture sediment at the storm drain outfall below the Seasons Subdivision.
- Turf sod does not adequately prevent channel erosion.

Best Management Practices-Effective

- Landscape ponds capture sediment
- Some Areas of riparian vegetation are preserved, providing water treatment, erosion control and wildlife habitat
- Trails allow access to the public, connecting locals to the watershed.
- Trail and road crossings serve as grade controls, limiting channel incision.

Recommendation, Proactive

- Promote the benefits of riparian vegetation versus weak rooted turf sod
- Protect functioning riparian areas from degradation

Recommendation, Management

- Encourage riparian buffer zones to replace sod adjacent to streams
- Enforce construction site erosion and sediment control
- Control the spread of tall whitetop weeds
- Reduce application of fertilizers, herbicides, and pesticides

Recommendation, Restoration

- Modify watershed runoff and sediment loads
- Improve existing riparian corridor vegetation
- Implement soil bioengineering

Reach Summary: Dog Creek, Lower

Location

Dog Creek flows south from the mountains north of Verdi. It converges with the Truckee River near the bridge on Old Bridge Road.

Sensitivity to Disturbance

Very low. The stream may be relatively stable even though it is channelized through the upper part of this reach.

Condition

Proper Functioning Condition, Dog Creek exists in a stable condition. Rocky soils and riparian vegetation resists erosion. Water Clarity is very good.

Trend

Upward, assessments conducted in 2002 indicate minor erosion and damaged vegetation resulting from the 1997 flood. Current assessments show that banks are stabilizing and vegetation is good. Water clarity is good.

Problems

- The stream is confined by a berm in the upper part of the reach and minor erosion was observed
- Unusual high density of blue-green algae may indicate under treated septic from individual systems at residences along the creek.

Best Management Practices-Ineffective

- Does not apply

Best Management Practices-Effective
- Rockery wall toe protection along the creek
- Properly designed road drainage

Recommendation, Proactive
- Monitor water chemistry to determine if nutrients are entering the creek
- Monitor bank erosion

Recommendation, Management
- Does not apply

Recommendation, Restoration
- Does not apply

Reach Summary: Unnamed Stream near Mogul, Upper

Location

The stream is located on the south slope of Peavine Mountain and flows south from the Summerset Subdivision to the Mogul community. It enters the Truckee River near the west end of 4th Street.

Sensitivity to Disturbance

Moderate, the stream may be relatively resistant to erosion if the channel or watershed are disturbed

Condition

Functional at Risk, the stream is considered At Risk due to channel erosion, sediment in the channel and impact to riparian vegetation.

Trend

Downward, the trend may reverse as grading activity is completed and stormwater drainage systems are installed.

Problems
- Stream channel erosion
- Sediment in the stream channel and accumulating in basins
- Recent revegetation planting within the stream channel appears largely unsuccessful and irrigation system does not appear functional
- Weeds observed include tall whitetop, thistle, tamarack

- Unusually high flows enter the channel from offsite, estimate 50 gallons per minute. Source may be irrigation runoff and may contain lawn care chemicals

Best Management Practices-Ineffective

- Site may benefit from erosion control, such as mulch, tackifier, and seed.
- Some sediment control structures require maintenance
- Sediment basins may be useful to treat concentrated flows before discharging to the stream.

Best Management Practices-Effective

- Silt fence at the tow of disturbed areas
- Fiber rolls at perimeter of disturbances
- Drop inlet protection
- Check dams
- Stormdrain outlet & inlet protection
- Street sweeping

Recommendation, Proactive

- Promote developing trails that connect the community to the streams
- Preserve existing vegetation
- Public education to reduce watering & lawn care chemicals at residences and golf course.
- Promote Low Impact Development
- Continued monitoring of weeds and channel erosion/sedimentation

Recommendation, Management

- Storm water runoff treatment, sediment basins
- Enforce construction site erosion and sediment control
- Control building-site encroachment
- Control road encroachment
- Control tall whitetop weeds

Recommendation, Restoration

- Does not apply

Reach Summary: Unnamed Stream near Mogul, Middle

Location

The stream is located on the south slope of Peavine Mountain and flows south from the Summerset Subdivision to the Mogul community. It enters the Truckee River near the west end of 4th Street.

Sensitivity to Disturbance

Low, rocky soil and healthy riparian vegetation limit the risk of erosion**.**

Condition

Functional at Risk, due to weed problems and minor erosion

Trend

Upward, stabilizing channel form and improving riparian vegetation result in a stream that resists erosion and provides water purification benefits.

Problems

- Small colonies of tall whitetop weeds and dense patches of thistle
- Tamarack, a noxious weed, is planted in the landscape
- Minor erosion is observed where the multiple use trail encroaches on the stream
- Algae was observed in the stream
- Unusually high flows enter the channel from offsite, estimate 50 gallons per minute. Source may be irrigation runoff and may contain lawn care chemicals

Best Management Practices-Ineffective

- Not observed

Best Management Practices-Effective

- Check dams
- Street sweeping
- Rockery retaining walls
- Rock rip rap slopes
- Multiple use trails promote connection with the watershed

Recommendation, Proactive

- Public education to reduce watering & lawn care chemicals at residences and golf course.
- Continued monitoring of weeds and channel erosion/sedimentation
- Monitor water chemistry to determine source of nutrients

Recommendation, Management

- Control tall whitetop weeds and remove tamarack plants

Reach Summary: Unnamed Stream near Mogul, Lower

Location

The stream is located on the south slope of Peavine Mountain and flows south from the Summerset Subdivision to the Mogul community. It enters the Truckee River near the west end of 4th Street.

Sensitivity to Disturbance

Moderate, due to rocky soils**,** the stream may be relatively resistant to erosion if the channel or watershed is disturbed

Condition

Non-functional, due to poor channel geometry, water quality, vegetation and erosion.

Trend

Not apparent, stream conditions appear similar to assessments conducted in 2002

Problems

- The creek was channelized into a very straight alignment to economize development
- Steep dirt banks do not support vegetation
- Straight alignment results in bank erosion and incision
- Riparian vegetation is removed to improve flood flows
- Flood conveyance requirements may limit options to revegetate the channel
- Algae was observed in the channel indicating high nutrient levels
- Tall whitetop and thistle weeds were observed

Best Management Practices-Ineffective

- Erosion control is needed on the steep channel banks

Best Management Practices-Effective

- Multiple use trails promote connection with the watershed

Recommendation, Proactive

- Continue monitoring weeds and channel erosion
- Monitor water chemistry and investigate source of nutrients
- Promote installation of erosion control and riparian vegetation along channel banks that is compatible with conveying flood flows

Recommendation, Management

- Control tall whitetop and thistle weeds

Reach Summary: Chalk Creek, Upper

Location

Chalk Creek is located on the south slope of Peavine Mountain, flows east of McQueen High School and parallels Rob Drive. It enters the Truckee River about one mile west of North McCarran Boulevard.

Sensitivity to Disturbance

Very High, this indicates that even minor disturbances to the stream system may result in channel erosion.

Condition

Functional at Risk, the main concerns are invasive weeds, minor bank erosion and poor water clarity. For the most part the condition of the upper reach is good.

Trend

Downward, many stream functions are stable including, channel form and vegetation, however there is a high risk of tall whitetop weed colonies expanding.

Problems

- Soil erosion observed where whitetop replaces good riparian vegetation
- Soil erosion is occurring where development encroaches on the stream channel
- Mosquito larvae observed in standing water
- Water enters the channel near Mae Ann Drive. The source is unknown
- Water has poor clarity and algae is growing on the surface

Best Management Practices-Ineffective

- Excessive yard irrigation flows may carry nutrients to the creek

Best Management Practices-Effective

- Armored stormdrain outfalls
- Revegetated fill slopes
- Retaining walls
- Multiple use trails
- Rock rip rap

Recommendation, Proactive

- Education to reduce over watering and over use of lawn care chemicals
- Water chemistry monitoring to determine source of water entering the channel

Recommendation, Management

- Reduce application of fertilizers, herbicides, and pesticides
- Control tall whitetop

Reach Summary: Chalk Creek, Middle

Location

Chalk Creek is located on the south slope of Peavine Mountain, flows east of McQueen High School and parallels Rob Drive. It enters the Truckee River about one mile west of North McCarran Boulevard.

Sensitivity to Disturbance

High, even minor disturbances to the stream system or watershed may result in channel erosion.

Condition

Functional at Risk, concerns are invasive weeds that replace riparian vegetation and apparent construction related erosion and deposition.

Trend

Downward, tall whitetop weed colonies appear to expand and lack of controls at construction sites may allow erosion and deposition to continue.

Problems

- whitetop replaces good riparian vegetation
- Soil erosion and deposition

Best Management Practices-Ineffective

- Fiber rolls require maintenance
- Silt fence needs maintenance
- Erosion control, such as mulch, seed and tackifier may be needed on disturbed slopes
- Outfalls at drainage swales are eroding and may require armoring
- Sediment is not captured upstream of the channel

Best Management Practices-Effective

- Multiple use trails
- Some fiber rolls are intact
- Some silt fencing is in place

Recommendation, Proactive

- Educate developers/contractors to implement effective SWPPPs
- Promote the implementation of effective weed control

Recommendation, Restoration

- Implement effective SWPPPs
- Control tall whitetop weeds by mowing and selective use of herbicides

Reach Summary: Chalk Creek, Lower

Location

Chalk Creek is located on the south slope of Peavine Mountain, flows east of McQueen High School and parallels Rob Drive. It enters the Truckee River about one mile west of North McCarran Boulevard.

Sensitivity to Disturbance

Very High, the upper part of the reach has channel characteristics that appear to be sensitive to disturbance, while the lower part appears more resilient.

Condition

Functional at Risk. Main concerns are invasive weeds that replace riparian vegetation.

Trend

Not apparent. Tall whitetop weed colonies appear to be static.

Problems

- Tall whitetop weeds replace good riparian vegetation

Best Management Practices-Ineffective

- none observed

Best Management Practices-Effective

- rock rip rap controls bank erosion
- good road and ditch crossings

Recommendation, Proactive

- Promote the implementation of effective weed control

Recommendation, Restoration

- Control tall whitetop weeds by mowing and selective use of herbicides
- Construct multiple use trails that connect the public to the watershed
- Multiple use trails could provide access to control tall whitetop weeds
- Develop a narrow low flow channel that promotes riparian vegetation in the upper part of the reach

Reach Summary: Peavine Creek, Upper

Location

Peavine Creek flows southeast from the southeastern flank of Peavine Mountain. The drainage is roughly between Seventh Street and Kings Row and effectively terminates at a flood control structure near Clayton Jr. High School

Sensitivity to Disturbance

High, minor disturbances to the stream system or the watershed may result in channel erosion

Condition

Functional At Risk, the stream is considered At Risk due to construction related erosion and sediment deposition. Also, tall whitetop weeds colonize sediment plumes and disturbed soil.

Trend

Downward, sediment deposition may decline as development is completed; however, erosion may accelerate as peak flows increase. Invasive weed colonies appear to expand.

Problems

- Very deep gully erosion, apparently resulting from development
- Sediment accumulating in the stream channel and in flood control structures
- Erosion and deposition impact desirable vegetation
- Tall whitetop weeds colonize sediment plumes and disturbed soil

Best Management Practices-Ineffective

- Conveyance of stormwater from construction sites
- Sediment control
- Erosion control

Best Management Practices-Effective

- Slopes are properly tracked with heavy equipment
- Revegetation on fill slopes at older developments
- Good examples of low impact development observed in older residential areas
- Multiple use trails connect the community to the watershed

Recommendation, Proactive

- Recognize examples of LID
- Monitor stream recovery where impacted by erosion and deposition
- Promote weed eradication

Recommendation, Management

- Storm water runoff treatment
- Enforce construction site erosion and sediment control
- Control tall whitetop

Reach Summary: Peavine Creek, Middle

Location

Peavine Creek flows southeast from the southeastern flank of Peavine Mountain. The drainage is roughly between Seventh Street and Kings Row and effectively terminates at a flood control structure near Clayton Jr. High School

Sensitivity to Disturbance

High, minor disturbances to the stream system or watershed may result in channel erosion

Condition

Functional at Risk, tall whitetop weeds, minor erosion and road encroachment affect stream function in the reach

Trend

Upward, construction related problems may decline as development is completed upstream. Invasive weed colonies appear manageable at this time.

Problems

- Road encroaches on the channel
- Sediment accumulating in the stream channel and in flood control structures
- Tall whitetop weeds colonize sediment plumes and disturbed soil
- Isolated erosion
- Mosquito larvae were observed

Best Management Practices-Ineffective

- Riparian vegetation has been removed in a few locations

Best Management Practices-Effective

- Slopes are properly tracked with heavy equipment
- Older fill slopes have revegetated nicely
- Good riparian vegetation that resists erosion found along most of the channel

Recommendation, Proactive

- Promote weed eradication

- Monitor stream to locate mosquito breeding areas
- Monitor dirt access road that encroaches on the channel

Recommendation, Management
- Control tall whitetop

Recommendation, restoration
- Improve riparian vegetation at sites of channel erosion

Reach Summary: North Evans Creek, Upper

Location

North Evans Creek flows from the southeast flank of Peavine Mountain in northwest Reno. The upper reach begins at Parr Boulevard and the low reach flows to Rancho San Rafael Park by the University of Nevada, Reno.

Sensitivity to Disturbance

High, minor disturbance in the watershed or stream may result in stream channel erosion

Condition

Functional at Risk, the reach is affected by problematic stormwater drainage, a damaged culvert, invasive weeds and vehicle impacts.

Trend

Downward. Currently the trend appears to be downward because weed colonies appear to expand and stormwater drainage problems are not repaired. Vehicle impacts are decreasing

Problems
- Stormwater drainages lack armoring and may be a source of sediment
- Trenching may result in concentrated flows and erosion
- Invasive weeds include thistle and tall whitetop
- A 4' concrete culvert end section is separating from the rest of the culvert
- Trash exists in the stream floodplain
- Off highway vehicles create ruts in the stream floodplain

Best Management Practices-Ineffective
- Stormwater drainages are not armored to the valley bottom
- A 4' culvert end section needs repair

Best Management Practices-Effective

- Upper storm drainages are armored
- Disturbed areas in the upstream development were treated with erosion control
- During development, areas were properly track walked with heavy equipment
- Multiple use trails connect the community with the watershed

Recommendation, Proactive

- Install signage that promotes stewardship of the watershed
- Monitor areas of potential erosion

Recommendation, Management

- Enforce construction site erosion and sediment control
- Control impacts from vehicles
- Control invasive weeds

Recommendation, Restoration

- Improve energy dissipation at drainage swales
- Repair culvert
- Remove trash

Reach Summary: North Evans Creek, Middle

Location

North Evans Creek flows from the southeast flank of Peavine Mountain in northwest Reno. The upper reach begins at Parr Boulevard and the low reach flows to Rancho San Rafael Park by the University of Nevada, Reno.

Sensitivity to Disturbance

Low, this indicates that stream is relatively durable and may not be impacted by minor disturbances to the watershed

Condition

Functional at Risk, the reach is in good condition with the exception of invasive weeds.

Trend

Not apparent, weed colonies do not appear to expand rapidly

Problems

- Invasive weeds include thistle and tall whitetop

Best Management Practices-Ineffective

- None observed

Best Management Practices-Effective

- Multiple use trails connect the community with the watershed
- Multiple use trail is properly installed and does not appear to impact the creek

Recommendation, Proactive

- Install signage that promotes stewardship of the watershed

Recommendation, Management

- Control invasive weeds

Recommendation, Restoration

- None

Reach Summary: North Evans Creek, Lower

Location

North Evans Creek flows from the southeast flank of Peavine Mountain in northwest Reno. The upper reach begins at Parr Boulevard and the low reach flows to Rancho San Rafael Park by the University of Nevada, Reno.

Sensitivity to Disturbance

High, this indicates that even minor disturbances within the watershed or the stream channel could result in erosion

Condition

Functional at Risk, the reach is in good condition with the exception of invasive weeds.

Trend

Not apparent, weed colonies do not appear to expand rapidly

Problems

- Invasive weeds include thistle and tall whitetop

Best Management Practices-Ineffective

- None observed

Best Management Practices-Effective

- Multiple use trails connect the community with the watershed
- Multiple use trails are properly installed and do not appear to impact the creek

Recommendation, Proactive
- None

Recommendation, Management
- Control invasive weeds

Recommendation, Restoration
- None

Reach Summary: Roberts Creek, Lower

Location

Roberts Creek flows north from the Carson Range south of Interstate 80. The creek meets the Truckee River at the Belli Ranch Development southeast of Verdi.

Sensitivity to Disturbance

Low, the stream may be relatively resistant to erosion if the stream channel or watershed is disturbed.

Condition

Functional at Risk, the stream is in very good condition; however, in a short segment stream function is impacted by development

Trend

Downward, impact from development is expected to continue until project completion. Riparian vegetation may not recover and bank erosion may result.

Problems
- Riparian vegetation was removed during construction
- Fill was pushed to the edge of the channel
- Existing residence has replaced riparian vegetation with turf sod
- Noxious weeds were observed in the area, but not on the channel

Best Management Practices-Ineffective
- BMPs were not observed at the custom home construction site

Best Management Practices-Effective
- Most of the channel is undisturbed and stabilized by riparian vegetation

Recommendation, Proactive

- Monitor areas of potential erosion
- Inform owner/contractor of BMP requirements
- Promote riparian vegetation to replace turf sod

Recommendation, Management

- Enforce stream ordinance that prohibits disturbance within 30'of the stream
- Enforce construction site erosion and sediment controls
- Control invasive weeds

Recommendation, Restoration

- Improve existing riparian corridor vegetation
- Implement SWPPP if over 1 acre of disturbance

NORTH TRUCKEE DRAIN

Tab Position 2

NORTH TRUCKEE DRAIN

Reach Summary: North Truckee Drain, Upper

Location

The North Truckee Drain originates near Wingfield Springs. It flows south through Spanish Springs Valley, then parallels Sparks Boulevard and crosses Interstate 80 near Wild Island. It meets the Truckee River just south of the Alamo Truck Stop. This summary is for the Spanish Springs reach.

Sensitivity to Disturbance

Moderate, low slope, wide channel and good soil characteristics limit the risk of channel erosion

Condition

Functional at Risk, the reach is in good condition, however, ineffective construction BMPs and invasive weeds threaten stream function

Trend

Upward, completion of construction activities may result in improved water clarity. Riparian vegetation is robust and improving in the relatively new channel.

Problems

- Erosion results in poor water clarity in the upper part of the reach
- BMPs do not control erosion or sediment
- Invasive weeds were observed
- Algae may indicate high nutrient levels
- Abandoned stream crossing may become a sediment source during high flows
- Low flow channel may need improvement

Best Management Practices-Ineffective

- Sediment control, upper part of the reach
- Erosion control, upper part of the reach

Best Management Practices-Effective

- Good riparian vegetation in the flood channel
- Erosion control on the banks of the newly constructed flood channel
- Energy dissipation at stormdrain outfalls
- Rip rap protection on erodable banks
- Storm drain outfalls located low in the channel
- Trails invite the public to connect with the watershed

Recommendation, Proactive

- Monitor water chemistry to determine source of nutrients
- BMP training is badly needed at the upstream construction site
- Encourage the golf course to reduce turf care chemicals
- Encourage reduced yard watering and lawn care chemicals

Recommendation, Management

- Enforce construction site erosion and sediment control
- Control invasive weeds

Recommendation, Restoration

- Remove temporary construction road
- Improve low flow channel as needed to limit mosquito breeding habitat

Reach Summary: North Truckee Drain, Middle

Location

The North Truckee Drain originates near Wingfield Springs. It flows south through Spanish Springs Valley, then parallels Sparks Boulevard and crosses Interstate 80 near Wild Island. It meets the Truckee River just south of the Alamo Truck Stop. This reach is at the south end of Spanish Springs Valley.

Sensitivity to Disturbance

Very High, minor disturbances to the stream or the watershed may result in channel erosion.

Condition

Functional at Risk, the reach is in good condition, however, ineffective construction BMPs and invasive weeds threaten stream function

Trend

Downward, construction activities that encroach on the channel and introduce sediment may continue. Invasive weed colonies may expand as soils are disturbed.

Problems

- Improved placement and maintenance of BMPs is required
- Improved BMPs are needed at a temporary stream crossing
- Development encroachs on the channel
- Sediment plume at stormdrain outfall indicates need for improved erosion control
- Invasive weeds
- Algae may indicate high nutrient levels

Best Management Practices-Ineffective

- Construction site sediment control
- Construction site erosion control

Best Management Practices-Effective

- Most of the channel is protected by properly installed silt fence and fiber rolls
- Rockery walls reduce steepness of slopes
- Water is applied to control dust
- A very good tire cleaning system is in place to prevent dirt tracking on roads
- Storm drain inlets are protected from sediment
- Riparian vegetation is protected

Recommendation, Proactive

- monitor water chemistry
- monitor channel function during and post construction

Recommendation, Management

- Enforce construction site erosion and sediment control
- Erosion controls should be implemented where grading is complete or stopped more than 30 days
- Implement a practical weed management program
- No disturbances should be allowed within 30 feet of either side of the channel

Recommendation, Restoration

- none

Reach Summary: North Truckee Drain, (Sparks Boulevard)

Location

The North Truckee Drain originates near Wingfield Springs. It flows south through Spanish Springs Valley, then parallels Sparks Boulevard and crosses Interstate 80 near Wild Island. It meets the Truckee River just south of the Alamo Truck Stop.

Sensitivity to Disturbance

Very High this indicates that even minor disturbances to the stream channel or the watershed may result in erosion.

Condition

Functional at Risk, a straight alignment is necessary to convey flows along Sparks Boulevard. Water quality is impacted by urban influences such as high nutrients in stormwater runoff and erosion, however, minnows were observed in the stream. Vegetation is surprisingly good. Some bank erosion was observed, but the channel appears to be vertically stable.

Trend

Upward, comparisons with assessments conducted in 2002 indicate improved water clarity and a reduction of noxious weeds. Riparian vegetation appears to be improving.

Problems

- Sediment enters the creek from road drainage and channel banks
- Erosion occurs on the steep channel banks
- Invasive weeds include purple loosestrife and tall whitetop
- Algae indicates that runoff from ball fields may contain nutrients
- Algae indicates that runoff from storm drains may contain nutrients
- Storm drains often convey water with poor clarity to the stream

Best Management Practices-Ineffective

- BMP maintenance at construction site near Prater and Sparks Blvd.
- Some bare soil banks of the channel would benefit from erosion control
- Runoff containing lawn care chemicals may result in nutrients entering the channel

Best Management Practices-Effective

- Riparian vegetation is protected
- Invasive weeds are controlled
- Storm drains discharge low in the channel
- Proper road drainage prevents erosion
- Multiple use trails connect the community with the watershed

Recommendation, Proactive

- Monitor water chemistry to determine sources of pollutants
- Monitor spread of desirable grasses that appear to control erosion on steep banks
- Educate owners of horse property to prevent erosion and nutrient transport
- Monitor water chemistry from ball field runoff to economize fertilizer applications

Recommendation, Management

- Continue to control invasive weeds

Recommendation, Restoration

- Improve drainage and erosion control along roads at selected sites
- Install erosion control on channel banks

Reach Summary: North Truckee Drain, Lower

Location

The North Truckee Drain originates near Wingfield Springs. It flows south through Spanish Springs Valley, then parallels Sparks Boulevard and crosses Interstate 80 near Wild Island. It meets the Truckee River just south of the Alamo Truck Stop. This reach is South of I-80.

Sensitivity to Disturbance

Very High, this indicates that even minor disturbances to the stream channel or the watershed may result in erosion.

Condition

Non Functional, Steep unvegetated channel banks erode and are a source of sediment, and water clarity is poor relative to the Truckee River.

Trend

Not apparent. The current assessment is similar to assessments conducted in 2002. Water clarity and quality may be somewhat better. This may be due to higher flows.

Problems

- Steep banks are unstable and are a source of sediment
- Steep banks are unvegetated
- Invasive weeds include purple loosestrife and tall whitetop
- Water clarity is poor relative to the Truckee River
- Algae indicates that runoff from storm drains may contain nutrients

Best Management Practices-Ineffective

- Channel banks lack erosion control
- Channel banks are unstable in some locations
- Invasive weeds out-compete desirable species

Best Management Practices-Effective

- Good riparian vegetation exists along the channel bottom
- Storm drains discharge low in the channel
- Proper road drainage prevents erosion

Recommendation, Proactive

- Monitor water chemistry to determine sources of pollutants

Recommendation, Management

- control invasive weeds
- enforce ordinances that may reduce sediment and nutrient transport to the stream

Recommendation, Restoration

- Improve riparian vegetation
- Stabilize over-steep banks
- Where possible, reduce the steepness of banks

Tab Position 3

WASHOE VALLEY

WASHOE VALLEY

Reach Summary: Musgrove Creek, Middle

Location

Musgrove Creek flows from the east slope of the Carson Range, crosses Franktown Road and enters the South end of Washoe Valley. The stream flows adjacent to low density housing and the Lightning W Golf Course.

Sensitivity to Disturbance

Moderate, the stream may be somewhat resilient if the channel or watershed is disturbed.

Condition

Functional, channel geometry is good, water flows clear and riparian vegetation is preserved in and alongside the channel. Only one small area of erosion was observed on ranch property.

Trend

Stable, The channel condition has improved, since the 2002 assessment, due to very good golf course management practices

Problems

- Poor vegetation and bank erosion on ranch property

Best Management Practices-Ineffective

- Ineffective pasture management along about 300 lineal feet of ranch property

Best Management Practices-Effective

- Riparian vegetation is preserved
- A stream buffer zone is protected
- Signage is in place to prevent traffic in buffer zone
- Turf care products are minimized near the stream
- The stream is treated as an amenity to the golf course

Recommendation, Proactive

- Make NDEP water quality test results available to golf course managers. This may be a useful tool to economize fertilizer applications

Recommendation, Management

- none

Recommendation, Restoration

- install fencing to protect the creek at ranch property

Tab Position 4

S. TRUCKEE MEADOWS

S. TRUCKEE MEADOWS

Reach Summary: South Evans Creek, Upper-Middle

Location

South Evans Creek flows from the east slopes of the sierras in three tributaries that converge just south of the Lake Ridge subdivision in southwest Reno. It flows east through Bartley Ranch Park and roughly parallels Del Monte Lane before converging with Dry Creek near the Sierra Pacific Building. This reach is between Bartley Ranch and the Del Monte Lane crossing.

Sensitivity to Disturbance

Very High, minor disturbances to the stream or the watershed may result in significant channel erosion

Condition

Non Functional, channel geometry is poor due to straightening and confinement. Water quality is good upstream of the Last Chance Ditch. Woody vegetation is good in the channel bottom; however stream banks are steep, bare soil. Erosion and deposition is occurring.

Trend

Not apparent. Assessments conducted in 2002 are very similar to current assessments.

Problems

- The straight alignment of the confined channel result in continuing erosion
- Vertical unvegetated banks are a source of sediment
- Tall whitetop weeds grow adjacent to the channel
- A construction site contributes sediment to the creek
- Last Chance ditch water, having poor clarity, enters the creek

Best Management Practices-Ineffective

- Poor channel geometry results in erosion and deposition
- BMPs were not observed at a construction site that drains to the creek

Best Management Practices-Effective

- Existing riparian vegetation is preserved

Recommendation Proactive

- Promote stream restoration within the park setting
- Educate owner and contractor at site where BMPs are absent
- Monitor Last Chance Ditch to determine source of pollutants

Recommendation Management

- Enforce construction site erosion and sediment control
- Control tall whitetop weeds

Recommendation Restoration
- Improve existing riparian corridor vegetation
- Create a wide floodplain with appropriate channel geometry (excavate)
- Shape banks to reduce slope failure hazard

Reach Summary: South Evans Creek, Middle-Middle

Location

South Evans Creek flows from the east slopes of the sierras in three tributaries that converge just south of the Lake Ridge subdivision in southwest Reno. It flows east through Bartley Ranch Park and roughly parallels Del Monte Lane before converging with Dry Creek near the Sierra Pacific Building. This reach is located within Anderson Park.

Sensitivity to Disturbance

Very High, Minor disturbances to the stream or the watershed may result in significant channel erosion

Condition

Functional at Risk, channel geometry varies from very good to poor. Water quality is affected by: Last Chance ditch water, construction site runoff and irrigation tail flows. Vegetation is good through most of the reach. Erosion and deposition are not significant through most of the reach.

Trend

Upward, channel geometry has improved following a 1997 flood. Water quality remains similar to 2002 assessments. Vegetation is improving and erosion and deposition may have reduced with better vegetation.

Problems
- At the low end of the reach, straight alignment and a confined channel result in continuing erosion
- At the low end of the reach, vertical banks are a source of sediment
- Tall whitetop weeds grow adjacent to the channel
- Ranch operation stockpiles manure along creek
- Upstream construction site contributes sediment to the creek

Best Management Practices-Ineffective
- At the low end of the reach, channel banks are steep and poorly vegetated

- BMPs were not observed at a construction site that drains to the creek
- Poor ranch practices result in nutrients entering the creek

Best Management Practices-Effective
- Existing vegetation is preserved

Recommendation Proactive
- Promote stream restoration within the park setting
- Educate owner and contractor at site where BMPs are absent
- Educate ranch owner regarding proper disposal of manure
- Stream restoration plans exist to restore this reach and are available from the Washoe Storey Conservation District. Restoration should be promoted.

Recommendation Management
- Enforce construction site erosion and sediment control
- Control tall whitetop weeds

Recommendation Restoration
- Improve existing riparian corridor vegetation
- Create a wide floodplain with appropriate channel geometry (excavate)
- Shape banks to reduce slope failure hazard

Reach Summary: South Evans Creek, Low-Middle

Location

South Evans Creek flows from the east slopes of the sierras in three tributaries that converge just south of the Lake Ridge subdivision in southwest Reno. It flows east through Bartley Ranch Park and roughly parallels Del Monte Lane before converging with Dry Creek near the Sierra Pacific Building. This reach is located within the business park west of the 395 Freeway.

Sensitivity to Disturbance

Low, the stream may be fairly resilient if the channel or the watershed is disturbed.

Condition

Functional at Risk, channel geometry is good following restoration to convey flood flows. Water quality is affected by: Last Chance ditch water, construction site runoff, and drainage from unarmored road swales. Riparian vegetation is emerging through most of the reach. Sediment enters the reach from offsite sources.

Trend

Upward, Channel geometry was improved to convey flood flows. Water quality remains similar to 2002 assessments. Vegetation is improving. Sediment carried to the channel may have increased due to poor erosion control along Kietzke Lane.

Problems

- Kietzke Lane drainage conveys sediment to the creek
- Water clarity is poor
- Tall whitetop weeds grow adjacent to the channel (manageable)
- Runoff from parking lots may impact water quality

Best Management Practices-Ineffective

- Poor erosion control along Kietzke Lane

Best Management Practices-Effective

- Riparian vegetation is preserved
- Restored channel has appropriate characteristics

Recommendation Proactive

- Educate property owners to manage tall whitetop
- Recommend appropriate BMPs along Kietzke Lane drainage
- Monitor water chemistry to determine sources of pollution
- Determine if parking lot drainage affects water quality

Recommendation Management

- Control tall whitetop weeds

Recommendation Restoration

- Install BMPs along Kietzke Lane

Reach Summary: South Evans Creek, Lowest-Middle

Location

South Evans Creek flows from the east slopes of the sierras in three tributaries that converge just south of the Lake Ridge subdivision in southwest Reno. It flows east through Bartley Ranch Park and roughly parallels Del Monte Lane before converging with Dry Creek near the Sierra Pacific Building. This reach is east of the 395 Freeway.

Sensitivity to Disturbance

High, most of the reach is armored and channelized, however, high flows may result in erosion to stream reaches that are unvegetated bare dirt.

Condition

Non Functional, the creek is channelized and does not retain any characteristics of a natural stream. Water quality is poor. Vegetation is poor. Erosion is controlled by various forms of channel armoring.

Trend

Not apparent, Channel geometry remains unchanged. Water quality remains similar to 2002 assessments. There is little opportunity for vegetation to improve. Sediment continues to be carried to the channel from adjacent property during storm runoff.

Problems

- Water clarity is poor
- Channel does not retain natural stream characteristics
- Thermal heating
- At the upper part of the reach, channel banks are eroding
- Runoff from parking lots may impact water quality
- Storm runoff from adjacent properties convey sediment to the creek

Best Management Practices-Ineffective

- Lack of erosion control at rain downspouts and drainage swales
- Lack of erosion control at construction sites
- Lack of BMPs at construction material wash-out sites
- Steep unvegetated channel banks

Best Management Practices-Effective

- Channel armoring

Recommendation Proactive

- Educate property owners to manage stormwater runoff
- Monitor water chemistry to determine sources of pollution
- Determine if parking lot drainage affects water quality
- Investigate potential for improving riparian vegetation. This may be challenging within a flood control channel.

Recommendation Management

- Enforce NPDES stormwater runoff rules

Recommendation Restoration

- Stabilize the channel in the upper reach
- Improve riparian vegetation where possible

Reach Summary: Dry Creek, Middle

Location

The headwaters of Dry Creek originate in four canyons in the mountains above south-west Reno. In the middle reach, three main tributaries of Dry Creek come together downstream of Lakeside Drive and Holcomb Lane to form a single channel near Panorama Drive. The stream crosses South Virginia Street just north of the Huffaker Lane intersection and flows east in a broad flood control channel that ultimately converges with Steamboat Creek.

Sensitivity to Disturbance

Very High, disturbances to the stream or the watershed may result in significant channel erosion

Condition

Functional at Risk, channel geometry is good along most of the reach. Water clarity is good in the upper part of the reach and poor in the lower reach. Vegetation is mostly rushes and sedges with less woody vegetation. Good vegetation limits erosion.

Trend

Upward, geometry has improved as vegetation stabilizes the channel banks. Water clarity appears similar to 2002 assessments. Vegetation has improved dramatically. Well vegetated banks resist erosion.

Problems

- Poor water clarity
- Ditch water diverted to the creek impacts stream clarity
- Tall whitetop and thistle weeds
- Isolated areas of erosion
- In a few locations, landscaping replaces riparian vegetation

Best Management Practices-Ineffective

- Improved armoring at culvert outfalls may reduce erosion

Best Management Practices-Effective

- Riparian vegetation is preserved
- Channel armoring is good in the lower part of the reach
- Good pasture management

- Good weed management in many locations

Recommendation, Proactive

- Promote small ranch education programs. Contact University of Nevada Cooperative extension.
- Monitor water chemistry to determine if individual septic systems are problematic
- Investigate ways to improve ditchwater quality

Recommendation, Management

- Control invasive weeds
- Reduce impact from livestock and animal wastes
- Encourage riparian buffer zones to replace sod adjacent to streams

Recommendation, Restoration

- Improve energy dissipation at culvert outfalls
- Shape banks to reduce slope failure hazard

Reach Summary: Thomas Creek, Upper Middle

Location

The headwaters of Thomas Creek are about two miles north of Mount Rose peak. It flows through medium density housing developments on the alluvial fan. The middle reach enters ranch property and large 3 to 10 acre residential lots near Thomas Creek Road. The middle reach ends at South Virginia Street. The creek ultimately converges with Steamboat Creek.

Sensitivity to Disturbance

Moderate, the stream may be relatively resilient if the channel or watershed is disturbed

Condition

Functional, the stream is mostly undisturbed and water clarity is good along the reach. Healthy vegetation along the banks of the channel resists erosion.

Trend

Not apparent, assessments conducted during 2002 are very similar to current assessments

Problems

- Steamboat Ditch water leaks into the creek impacting water clarity
- Erosion occurs near the small bridge on Thomas Creek Road

- Riparian vegetation is replaced by turf sod in a few locations, however, rocky soils limit the risk of erosion

Best Management Practices-Ineffective

- Energy dissipation, bank stabilization at the small bridge on Thomas Creek Road.

Best Management Practices-Effective

- riparian vegetation is preserved providing water treatment, erosion control and wildlife habitat

Recommendation, Proactive

- As development occurs, ensure the stream is protected
- Monitor stability of small bridge on Thomas Creek
- Monitor Ditch flows to locate source of poor water clarity

Recommendation, Management

- None

Recommendation, Restoration

- None

Reach Summary: Thomas Creek, Upper Middle

Location

The headwaters of Thomas Creek are about two miles north of Mount Rose peak. It flows through medium density housing developments on the alluvial fan. The middle reach enter ranch property and large 3 to 10 acre residential lots near Thomas Creek Road. The middle reach ends at South Virginia Street. The creek ultimately converges with Steamboat Creek.

Sensitivity to Disturbance

Very High, Even minor disturbances to the stream or the watershed may result in significant erosion.

Condition

Functional at risk, the stream is in good condition along the reach. In some locations the channel has been straightened and moved to economize pasture management. Water clarity is good. Good riparian vegetation with strong root systems resists erosion.

Trend

Upward, assessments conducted during 2002 indicated ranching practices resulted in relatively poor vegetation. Current assessments find very good riparian vegetation indicating an upward trend.

Problems

- Tall whitetop and thistle weeds were observed
- Riparian vegetation is replaced by turf sod in a few locations
- A home construction site, near the creek, would benefit from implementing BMPs

Best Management Practices-Ineffective

- A home construction site has stockpiled soil along the banks of the creek. No BMPs were observed.
- In a few locations, riparian vegetation is replaced by landscape sod

Best Management Practices-Effective

- A buffer zone along the channel is fenced to exclude livestock
- Riparian vegetation is preserved along the stream
- Typically development does not encroach on the channel
- Examples of low impact development were observed along the creek

Recommendation, Proactive

- As development occurs, ensure the stream is protected
- Educate owners and contractors to implement BMPs
- Encourage property owners to replace turf grass with riparian vegetation

Recommendation, Management

- Implement a weed management program to control tall whitetop and thistle
- Enforce stormwater protection rules at construction sites
- Enforce stream buffer zone ordinances
- Encourage riparian buffer zones to replace turf sod

Recommendation, Restoration

- none

Reach Summary: Whites Creek-South Fork, Upper Middle

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley. The upper reach roughly parallels the Mount Rose Highway. In

the middle reach, creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek.

Sensitivity to Disturbance

Low, the stream may be relatively resilient even if the channel or watershed are disturbed

Condition

Functional at Risk, the channel is relatively undisturbed along most of the reach, water clarity is good and vegetation is good. Erosion from roads and construction sites may contribute sediment to stream.

Trend

Not apparent. Channel geometry and the condition of vegetation remain good since the 2002 assessment. Erosion from roads and construction sites may affect water quality.

Problems

- Erosion from dirt roads may contribute sediment to the stream
- Lack of BMPs at pipeline installation sites may contribute sediment to the stream

Best Management Practices-Ineffective

- BMPs were not observed at pipeline installations near Government Housing Tract
- Erosion associated with dirt roads results in sediment entering the creek.

Best Management Practices-Effective

- Riparian vegetation is preserved

Recommendation, Proactive

- Investigate roads that may be a source of sediment in the Government Housing Tract. Propose methods to control erosion and improve drainage
- Educate contractors to implement BMPs at pipeline installations
- Monitor water chemistry to determine if individual septic systems are problematic

Recommendation, Management

- Enforce construction site erosion and sediment controls

Recommendation, Restoration

- Improve road drainage at Government Housing Tract

Reach Summary: Whites Creek-South Fork, Middle Middle

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley in a steep canyon. The upper reach roughly parallels the Mount Rose Highway. Creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek. This reach flows along Whites Creek Road.

Sensitivity to Disturbance

Very High, minor disturbances to the stream or the watershed may result in channel erosion

Condition

Functional at Risk, the creek has been realigned and straightened. Water quality benefits derived from natural functioning streams are not available. Vegetation is removed to improve flow conveyance.

Trend

Not apparent. Channel geometry and the condition of vegetation remain unchanged since the 2002 assessment. Invasive weeds are establishing along the channel. Erosion from construction sites, affecting the channel now, may stabilize after construction is complete.

Problems

- Sediment enters the creek from construction sites
- Stream bank erosion is occurring
- Invasive weeds (tall whitetop) were observed
- Bare dirt road drainages contribute sediment to the creek
- Landscape plants and grasses replace riparian vegetation

Best Management Practices-Ineffective

- BMPs are missing or poorly maintained at a construction sites on Whites Creek Lane
- Erosion is occurring in dirt drainages along roads near the South Valley Regional Park
- Riparian vegetation is not preserved

Best Management Practices-Effective

- Much of the stream is hard armored to prevent erosion
- Fiber rolls capture sediment at various locations
- In some locations riparian vegetation is preserved

Recommendation, Proactive

- Educate contractors to implement BMPs at construction sites
- Encourage replacing landscape plants with riparian vegetation along the reach
- Promote a demonstration restoration project at the South Valley Regional Park

Recommendation, Management

- Enforce construction site erosion and sediment controls
- Implement a management program to control tall whitetop weeds

Recommendation, Restoration

- The South Valley Regional Park is an excellent site for a model stream restoration project.
- Apply erosion control to road drainages, such as seed, mulch and tackifier

Reach Summary: Whites Creek-South Fork, Lower Middle

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley in a steep canyon. The upper reach roughly parallels the Mount Rose Highway. Creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek. This reach is east of the 395 Freeway.

Sensitivity to Disturbance

Very High in the upper part of the reach and lower in restored areas, minor disturbances to the upper part of the reach may result in channel erosion. The lower portion of the reach is armored and is relatively stable.

Condition

Functional at Risk, the upper part of the reach has a relatively straight alignment and there is a risk of erosion, however rocky soils and emerging riparian vegetation may improve stability over time. The lower reach has been restored to an appropriate channel configuration and good vegetation is emerging. Water quality is impacted by sediment entering the creek from adjacent construction activity.

Trend

Upward, good riparian vegetation is emerging that may stabilize the stream channel. Good channel geometry may limit the risk of erosion. As the channel begins to function as a natural stream, water quality benefits may be observed. Sediment loading may reduce when construction is complete.

Problems

- Sediment enters the creek from adjacent construction
- Invasive weeds (tall whitetop) were observed

Best Management Practices-Ineffective

- BMPs are missing or poorly maintained at construction sites
- Erosion control should be implemented where work is complete or stopped more than 30 days. This should include seed, mulch and tackifier.

Best Management Practices-Effective

- Restored stream configuration
- Check dams
- Topsoil reuse
- Rolled erosion control products
- Sediment retention basins

Recommendation, Proactive

- Educate contractors to implement BMPs at construction sites
- Encourage revegetation of disturbed areas
- Monitor project to identify successful and problematic restoration techniques

Recommendation, Management

- Enforce construction site erosion and sediment controls
- Implement a management program to control tall whitetop weeds

Recommendation, Restoration

- None

Reach Summary: Whites Creek-South Fork, Upper Middle

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley in a steep canyon. The upper reach roughly parallels the Mount Rose Highway. Creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek. This reach is west of Arrow Creek Drive.

Sensitivity to Disturbance

Low, the stream may be relatively resilient even if the channel or watershed is disturbed

Condition

Proper Functioning Condition, The stream exists in an undisturbed natural condition along this reach. Riparian vegetation is good to very good and provides habitat for wildlife. The stream characteristics resist erosion and the channel geometry is in balance with the riparian setting.

Trend

Not apparent. Assessments conducted in 2002 indicate that sediment from upstream road drainage and construction was problematic. Similar problems currently exist; however, stream characteristics appear good and stable in the reach.

Problems

- Erosion from dirt roads and pipeline installations may contribute sediment to the stream
- A home is constructed just downstream of the split in Whites Creek. The property encroaches on the stream and there is a risk of property damage during high flows.
- Due to very permeable soils there is a risk of under treated septic from individual systems entering the stream

Best Management Practices-Ineffective

- BMPs were not observed at pipeline installations near Government Housing Tract
- Erosion associated with road drainage may result in sediment entering the creek.

Best Management Practices-Effective

- Riparian vegetation is preserved

Recommendation, Proactive

- Investigate roads that may be a source of sediment in the Government Housing Tract. Propose methods to control erosion and improve drainage
- Educate contractors to implement BMPs at pipeline installations
- Monitor water chemistry to determine if individual septic systems are problematic

Recommendation, Management

- Enforce construction site erosion and sediment controls

Recommendation, Restoration

- Improve road drainage at Government Housing Tract

Reach Summary: Whites Creek-South Fork, Wolf Run Golf Course

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley in a steep canyon. The upper reach roughly parallels the Mount Rose Highway. Creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek.

Sensitivity to Disturbance

Low, the stream may be relatively resilient even if the channel or watershed is disturbed

Condition

Proper Functioning Condition, The stream exists in a relatively undisturbed natural condition along this reach. Riparian vegetation is mostly preserved and provides habitat for wildlife. The stream characteristics resist erosion and the channel geometry is in balance with the riparian setting.

Trend

Upward. Assessments conducted in 2002 indicate poor channel geometry, damaged riparian vegetation and evidence of erosion following completion of Golf Course construction. The site also experienced damage from the 1997 flood. The stream has recovered very well due to good management. Channel geometry is improved, vegetation is preserved and only minor erosion was observed where turf grass replaces riparian vegetation.

Problems

- In a few locations turf grass replaces riparian vegetation
- Isolated colonies of tall whitetop

Best Management Practices-Ineffective

- None

Best Management Practices-Effective

- Riparian vegetation is preserved
- Drainages are armored
- Good maintenance practices
- Water conservation/reuse
- Weed management program

Recommendation, Proactive

- Provide NDEP water quality data to the golf course management
- Use water quality data to economize turf treatments

- Promote establishing a buffer zone of rushes and sedges to replace turf sod along the banks of the creek

Recommendation, Management

- None

Recommendation, Restoration

- Replace turf sod with riparian rushes and sedges along banks of the creek

Reach Summary: Whites Creek-North Fork, Middle Middle

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley in a steep canyon. The upper reach roughly parallels the Mount Rose Highway. Creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek. This reach is east of Wolf Run Golf Course and west of Zolezzi Lane.

Sensitivity to Disturbance

Moderate, the stream may be somewhat resilient if the channel or watershed is disturbed.

Condition

Functional at Risk, the creek has been realigned and straightened. Water quality benefits, derived from natural functioning streams, are limited. Vegetation is removed to improve flow conveyance. Channel maintenance is required to repair erosion and deposition following storm events that produce high flows.

Trend

Not apparent. Channel geometry and the condition of vegetation remain unchanged since the 2002 assessment. Erosion and deposition patterns appear similar to previous assessment.

Problems

- Stream bank erosion is occurring
- Encroachment by development
- Development limits opportunities for stream improvement
- Landscape plants and grasses replace riparian vegetation
- Very permeable soils increase the risk of under-treated septic entering the creek

Best Management Practices-Ineffective

- In some locations riparian vegetation is removed

Best Management Practices-Effective

- Grade control structures in the channel
- In some locations riparian vegetation is preserved

Recommendation, Proactive

- Educate property owners to limit lawn care chemicals
- Encourage replacing landscape plants with riparian vegetation along the reach
- Monitor water chemistry to determine if individual septic systems are problematic

Recommendation, Management

- None

Recommendation, Restoration

- Improve riparian vegetation

Reach Summary: Whites Creek-North Fork, Lower Middle

Location

The headwaters of Whites Creek originate just north of Mount Rose Peak and flow east to the valley in a steep canyon. The upper reach roughly parallels the Mount Rose Highway. Creek flows split about evenly near Thomas Creek Road. Both forks flow east and ultimately converge with Steamboat Creek. This reach is between Zolezzi lane and South Virginia Street.

Sensitivity to Disturbance

High, disturbances to the watershed or stream may result in channel erosion.

Condition

Functional at Risk, Channel geometry is relatively good and development does not encroach on the stream. Good channel form and riparian vegetation provide water quality benefits. Vegetation is mostly good and only a few minor areas of bank erosion were observed.

Trend

Upward, channel characteristics and vegetation appear to improve. High flows access the floodplain limiting the risk of future erosion. Nearby development appears complete and does not encroach on the stream.

Problems

- Invasive weeds (tall whitetop and thistle) were observed

Best Management Practices-Ineffective

- None

Best Management Practices-Effective

- Development does not encroach on the stream or floodplain
- Riparian vegetation is preserved

Recommendation, Proactive

- A large property is for sale near South Virginia Street. Planners should ensure the stream is protected during development so values are preserved including: flood control, water treatment, wildlife habitat, and recreation.
- Multiple use trails would be very appropriate in the reach. This would connect the community with the watershed.
- Monitor water chemistry to determine if individual septic systems are problematic

Recommendation, Management

- Control the spread of noxious weeds

Reach Summary: Jones Creek, Middle

Location

Jones Creek flows from the east slope of the Sierras near the Mont Rose Highway. The headwaters are in National Forest and are relatively undisturbed. Low density development along the creek begins east of the Mount Rose Highway. This reach of Jones Creek begins at the edge of private property, about a mile upstream of the Callahan Ranch Road Crossing and ends at the confluence with Galena Creek.

Sensitivity to Disturbance

Low, the stream may be relatively resilient if the channel or watershed are disturbed

Condition

Functional at Risk, stream characteristics and vegetation are good and water quality does not appear to be impacted in the reach. Some isolated areas of erosion were observed and are probably the result of the flood of 1997.

Trend

Upward, The stream channel is rejuvenating following high flows associated with the 1997 flood. Channel characteristics and vegetation have improved following 2002 assessments.

Problems

- Erosion downstream of the Callahan Ranch Road crossing
- Invasive weeds include tall whitetop and star thistle
- Construction related sediment may enter the creek

Best Management Practices-Ineffective
- BMPs at construction sites
- Bare dirt drainage swales

Best Management Practices-Effective
- BMPs are implemented at major development near the Mount Rose Highway and Callahan Ranch Road
- Multiple use trails connect the community with the watershed
- Local citizens volunteer to control weeds and maintain trail

Recommendation, Proactive
- Educate developers to implement BMPs at construction sites

Recommendation, Management
- Enforce construction site erosion and sediment control

Recommendation, Restoration
- Create floodplain (excavate) downstream of Callahan Ranch Road
- Shape banks to reduce slope failure hazard downstream of Callahan Ranch Road

Reach Summary: Galena Creek, Middle

Location

The headwaters of Galena Creek are located between Mount Rose and Slide Mountain at about the 7000 foot level. Much of the upper reach is undisturbed. The creek crosses the Mount Rose Highway and flows east through the Montreux Golf Course and Development. The middle reach begins at Callahan Ranch road and ends in Pleasant Valley.

Sensitivity to Disturbance

Very Low, the stream may be resilient if the channel or watershed are disturbed

Condition

Functional at Risk, The channel geometry is in balance with the watershed and topography. Vegetation is healthy, provides good wildlife habitat and provides water treatment characteristics. The stream is considered at risk due to areas of erosion and colonies of tall whitetop.

Trend

Upward, The stream channel is rejuvenating following high flows associated with the 1997 flood. Channel characteristics and vegetation have improved following 2002 assessments.

Problems

- Construction related sediment may enter the creek
- Erosion downstream of the Callahan Ranch Road crossing
- Invasive weeds (tall whitetop)

Best Management Practices-Ineffective

- Storm drainage BMPs at I-580 Bridge construction site

Best Management Practices-Effective

- Silt fence
- Sediment basins
- Concrete washout area
- Erosion control on fill slopes
- Stabilized construction roadway
- Good temporary stream crossing

Recommendation, Proactive

- Monitor BMPs to ensure effectiveness
- Monitor erosion at confined stream channel downstream from Callahan Ranch Road

Recommendation, Management

- Enforce construction site erosion and sediment control. Armor stormwater drainage at bridge construction site and install effective sediment control at outfall. Ensure proper maintenance of BMPs
- Implement a weed management program

Recommendation, Restoration

- none

Reach Summary: Browns Creek, Middle

Location

The headwaters of Browns Creek are located north of Slide Mountain. Much of the upper reach is undisturbed. The creek crosses the Mount Rose Highway and flows east near Joy Lake Road before entering St. James Village. It flows down a steep canyon then converges with Steamboat Creek just north of Washoe Lake.

Sensitivity to Disturbance

Low, the stream may be resilient if the channel or watershed is disturbed

Condition

Proper Functioning Condition, The channel geometry is in balance with the watershed. Vegetation is healthy, provides good wildlife habitat and provides water treatment. Erosion and deposition patterns are consistent with the landscape setting.

Trend

Upward, The stream channel is rejuvenating following high flows and erosion associated with the 1997 flood. Channel characteristics and vegetation have improved following 2002 assessments.

Problems

- Saint James Village stormdrain outfall armoring may be ineffective BMP
- maintenance is needed at the I-580 Bridge construction site

Best Management Practices-Ineffective

- Maintenance may be required at sediment control devices
- Armoring at the storm drain outfall from Saint James Village

Best Management Practices-Effective

- I-580 bridge, Silt fence
- I-580 bridge, Sediment basins
- I-580 bridge, Concrete washout area
- I-580 bridge, Erosion control on fill slopes
- I-580 bridge, Stabilized construction roadway
- I-580 bridge, Good temporary stream crossing
- Saint James Village incorporates Low Impact Development concepts into their subdivision
- Riparian vegetation is preserved

Recommendation, Proactive

- I-580 bridge, monitor BMPs to ensure effectiveness
- Browns Creek would be an excellent site for multiple use trails

Recommendation, Management

- I-580 bridge, enforce construction site erosion and sediment control rules that require monitoring and maintenance of BMPs

Recommendation, Restoration

- Improve armoring at Saint James Village storm water outfall